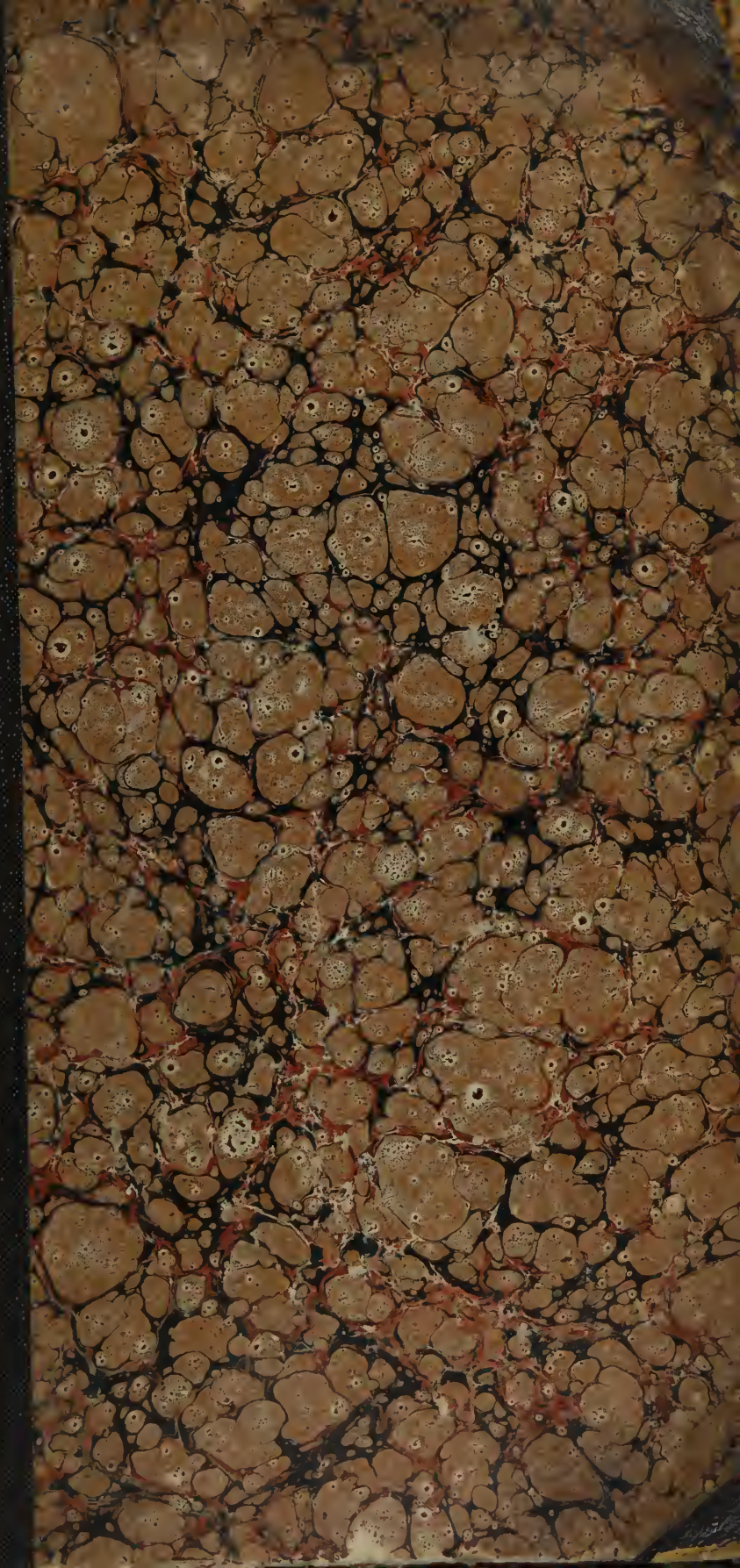


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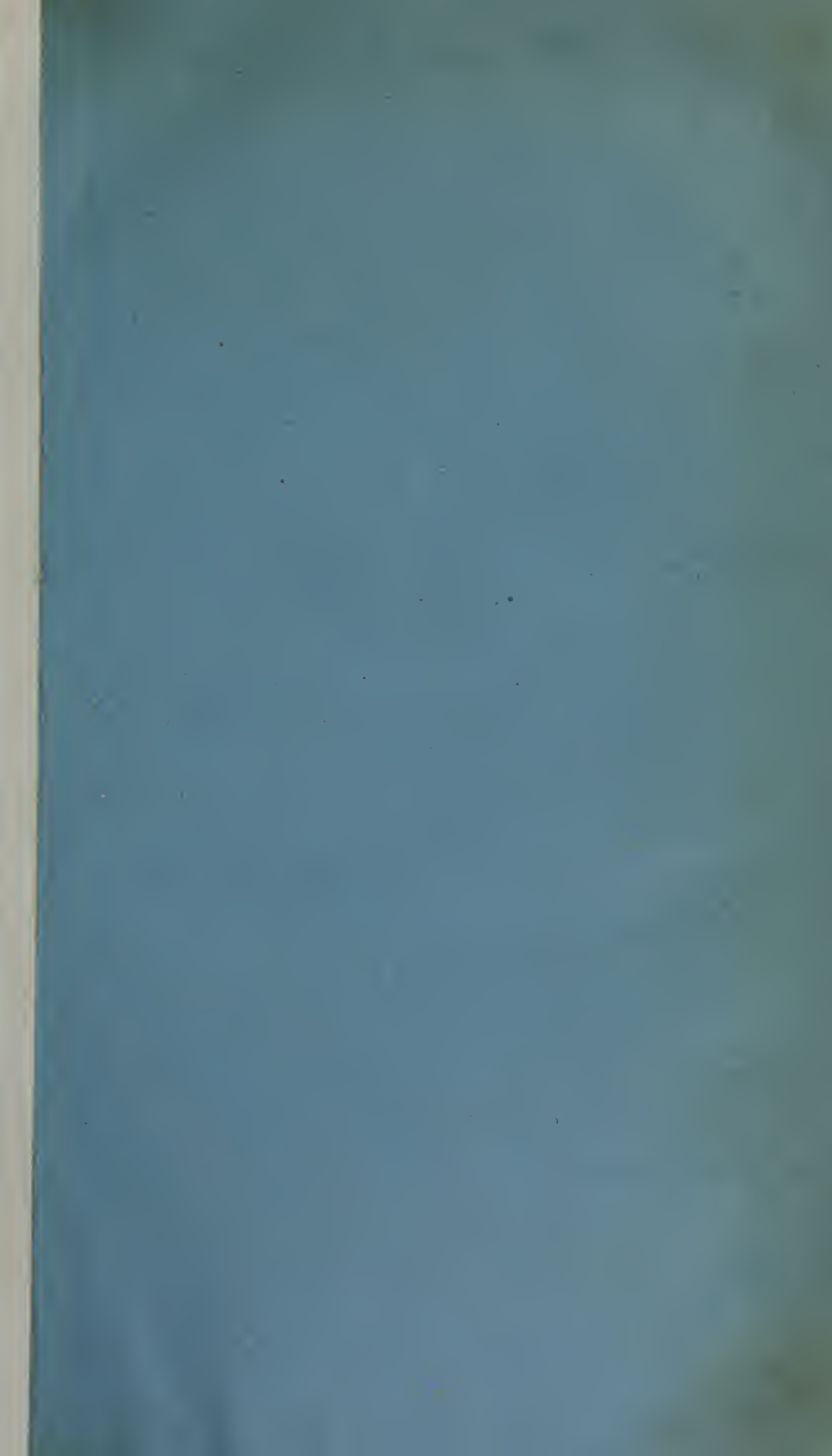
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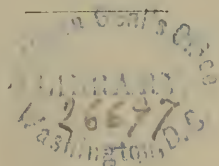
OF THE

*Presented by
J. A. Bennett
M. D.*

MOUTH.

✓
BY JAMES W. WHITE.

TO WHICH IS APPENDED A CHAPTER ON "PORCELAIN TEETH," FROM
THE NEW EDITION OF HARRIS'S PRINCIPLES AND
PRACTICE OF DENTISTRY.



PHILADELPHIA:
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TAKING IMPRESSIONS OF THE MOUTH.

PERHAPS no department of mechanical dentistry has received less attention at the hands of speakers and writers than that of taking impressions of the mouth, and for this reason, probably, there is no department in which so large a number of students and practitioners find themselves at times unsuccessful. It is hoped that in these pages, advantage being taken of all the available literature of the subject, practical hints may be *combined* which will be of service, at least, to beginners, in helping them to the attainment of better results in practice. Without a correct impression of the mouth to begin with, no subsequent care or skill can secure a good result, no matter of what material the base may be composed.

The first thing to be considered is the character and condition of the mouth,—1, whether there are teeth remaining or not; 2, if so, their shape and position; 3, the character of the arch, large or small, deep or flat; 4, the ridge, irregular or smooth; 5, the state of the gums, if uniformly hard or soft, or hard in some places and soft in others, *e.g.* ridge hard and palate soft, or soft ridge and hard palate.

Having ascertained all the difficulties to be overcome, the next step is to select a suitable tray in which to take the impression. It is not too much to say that most of the trays in use, especially those intended for the lower jaw, are ill adapted to the object. The tray should be of such shape and size as will allow its easy introduction into the mouth; also adapted to the particular case in hand, and with reference to the material to be employed. It should be large enough to embrace the alveolar ridge, leaving a space of an eighth or a quarter of an inch between its outer rim and the gum. The nearer it comes within these limits to fitting the mouth, the less material has to be employed, the less pressure is required, the less surplus material to offend the patient, and the more perfect the impression is likely to be. On the other hand, it must not fit too exactly; else *drawing*, if the impression be of wax, or complicated *fracture*, if it be of plaster, will be almost certain to occur. More care is requisite in the selection of a

tray for the inferior than for the superior jaw, for the reason that, owing to its divergence at the posterior part, and the extreme narrowness of the ridge, a slight variation will cause it to cut into the soft tissues and become painful to the patient, besides preventing a correct impression. The tray should pass well back toward the rami of the jaw and cover the border completely. If the anterior teeth are remaining, a tray specially adapted to such cases should be used, or an impression in wax or gutta-percha be first taken to approximate the required form. Partial impression-trays are not usually a necessity, all that can be accomplished with them being generally more easily attainable with a full-sized tray.

Temporary trays may be made of gutta-percha, which answer a very good purpose; but they must be enlarged by cutting away around the alveolar border and palatine arch, and roughened to retain the material used. An excellent substance for this purpose, and far superior to gutta-percha, is a preparation for taking impressions recently introduced by S. S. White. It hardens with great rapidity, takes an accurate impression, and is entirely free from stickiness.

A modification of the ordinary tray may readily be made with wax, to adapt it to a special case, provided it be of sufficient size to admit the necessary additions. In some instances, better results may be secured by bending and refashioning a britannia tray; in any case, the tray should possess a reasonable adaptation to the alveolar ridge and palate, if a perfectly satisfactory impression would be secured. The objection to the porcelain tray is that it cannot be modified to suit special cases, and is so smooth that the impression material may leave it and cling to the mouth.

The insertion of the tray may seem a trifling matter to the operator, but is frequently not so to the patient. Few lips will admit an impression-tray direct without an amount of stretching at once inconvenient and painful; and, in some cases, to secure a correct impression without subjecting the patient to serious discomfort, will require no little care and expertness on the part of the operator. Unusual width of the jaw is not unfrequently associated with a contracted commissure, and, in addition, the muscles of the mouth may be rigid and unyielding. Another difficulty is in the common attempt of the patient to open the mouth wide in an effort to assist the operator. The patient should be directed to guard against this by allowing the jaw and the lips to be entirely under the control of the operator. Standing at the right of the patient, he should present the tray obliquely to the mouth, one side resting against and pressing outward the corner of the mouth, while the opposite corner should be extended with the first and second fingers of the left hand; the tray should then be passed in with a rotatory movement

Before introducing the tray, the patient should be instructed to breathe through the nostrils, and to avoid swallowing during the operation. In breathing through the nostrils, the soft palate is depressed, and, coming into contact with the posterior edge of the impression, may produce involuntary muscular contraction of the parts and consequent nausea, but the liability of fragments of plaster being drawn into the pharynx is much increased when the patient breathes through the mouth. The act of swallowing is likely to produce a sensation of nausea by bringing the soft palate into contact with a foreign body. In cases of irritable fauces, inducing nausea, it has been recommended to lessen the irritability by previously gargling with a strong solution of tannin, or spirits of camphor, or camphor-water; others have recommended that the fauces be accustomed to the presence of a foreign body, by passing the feather end of a quill over the parts a few times before taking the impression, or by directing the patient to manipulate the parts frequently with a spoon for a few hours previous to the impression being taken; others consider that the surest way to prevent retching is to force the patient's chin well down upon the breast, after the cup is in place, and so retain it until the impression is removed. Others again direct the patient to place the tongue upon the posterior portion of the tray, and retain it in that position.

Having decided upon the tray to be used, the next question to determine is the material to be employed.

The object sought in taking an impression, is a correct representation of the parts as they are in their normal condition; and for this purpose there is needed a substance plastic at ordinary temperatures, and which will admit of having the parts concerned pressed into it without the use of force enough to cause pain or disturb the relative position and form of the different surfaces. It must also possess sufficient hardness or body to be retained in the tray under the pressure necessary to obtain an impression of the parts. It must solidify or harden in a brief time, and under conditions as to heat and moisture not incompatible with the mouth. It must not materially contract or expand in cooling or hardening, and at the same time should as nearly as possible be free from objections as to taste, smell, or appearance.

The substances or compounds which have been recommended from time to time are numerous and varied: 1, wax, white and yellow; 2, combinations of wax with paraffine, with gutta-percha, and with other materials; 3, gutta-percha, alone or in different combinations; 4, plaster of Paris, alone or combined with the use of wax. Besides these, there are various secret preparations, and some patented combinations. Of these materials, it would doubtless be unsafe to say that in all cases one will answer as well as another; a knowledge of their distinctive properties and applications is therefore desirable.

A metallic plate struck up in a zinc die is smaller than the mouth, by reason of the shrinkage of the die—unless this shrinkage is compensated for by the enlargement of the sand impression in removing the mould; a vulcanite plate is larger than the mouth, because of the expansion of the cast—unless this expansion is counteracted by the shrinkage of the material in vulcanizing: consequently the compression made by the force required, in taking an impression in wax, or the contraction of gutta-percha, may be made to serve a useful purpose. It is evident, therefore, that no definite rule can be given applicable to all cases; very much must be left to the judgment of the operator. It is frequently difficult to decide in advance which is the best material for a given case, and experiment alone can decide.

WAX.

Where beeswax is used, either a *pure* article should be obtained, or that which has been judiciously combined with a foreign substance for the specific purpose. Commercial adulterations with tallow, resin, vegetable wax, etc. injure it, making it difficult to manage. White wax has an advantage over the yellow, in that it does not so readily draw out of shape, and there is consequently less liability to have the impression distorted, than with yellow wax. It takes a sharper impression than the yellow, but it is more difficult to bring to the required plasticity, and more force is required to obtain a correct impression. In summer-time the additional hardness is in its favor.

Scrap wax of either variety should never be used without remelting, as it is difficult, if not impossible, to get it into a homogeneous mass. The difficulties in the use of wax are: That the pressure required forces all the soft parts out of normal position, and renders a perfect impression of some mouths with it impossible; the tendency to lose its form in withdrawing is also a serious objection to its use. It is inelastic, and contracts very slightly in cooling. It does not give as delicate a result as plaster, but is still preferred by some operators. Paraffine is frequently added to wax, and imparts to it the property of becoming plastic at a lower temperature. A small quantity improves it, especially for use in cold weather; but if in excess, it causes the wax to separate into layers, which are not easily reunited. It takes a sharper impression than wax alone, with less liability of drawing out of form; the addition of the paraffine in proper quantity causing the composition to be harder when cold than the wax alone. A combination of wax and gutta-percha is used, and highly prized by some, on account of its toughness. The objection to it is, that it is sticky. It will adhere to the plaster in taking a model unless previously varnished.

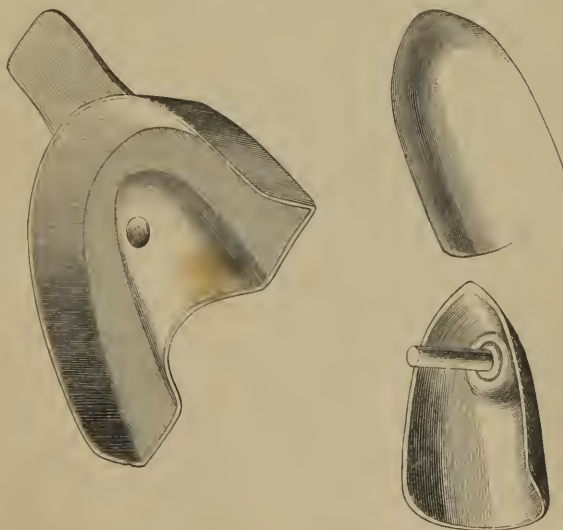
Having decided to use wax of either variety or combination, examine the mouth before taking the impression, so as to see the position of the

teeth, as a guide to its introduction and withdrawal in a line with their axes, in order to prevent dragging.

In case of a high arch, select a tray adapted to it, or pile up the wax in the tray to correspond with the form of the mouth. For such cases, some operators cut a piece from the central portion of the tray, large enough to admit the finger, and thus force the wax into the deeper portions of the arch. The practice of others is to dry the mouth with a napkin, and then fill the palatine arch with soft wax, down to a point nearly on a line with the alveolar border, keeping the surface of the wax dry; over this to apply the impression-tray with the wax quite soft, and thus obtain a perfect impression.

Dr. Thomas Wardle invented a tray, which he brought to the notice of the profession many years since, and which is still highly approved by some operators, for taking impressions in wax, either for partial or full dentures. This tray was designed principally to overcome two obstacles in the way of obtaining a correct impression, viz.: where, in cases requiring a partial plate, the crowns and convex sides of the remaining teeth prevented an accurate impression at the necks; and cases in which a contracted and high arch made it difficult to obtain an impression with the ordinary tray.

FIG. 1.



This tray is supplied with a movable palate plate, so adjusted that it is capable of forcing the centre of the wax up against the highest part of the arch, as well as laterally against the palatal sides of the necks of any remaining teeth, thus securing an exact impression of the parts within the alveolar border. These trays are flat, with the edge at a

right angle with the base ; a part of the base is arched in the centre ; near the front of the arch is a tube, through which passes a bar, corresponding in size to the tube, $\frac{3}{4}$ of an inch in length ; attached to this, by a socket joint, is the movable palate plate. These are of various sizes and elevations of arch. The socket joint permits them to have a swinging motion, so that pressure against the free end of the bar will elevate either end or side of the plate according to the form of the arch, —the same pressure which forces the wax upward also pressing it laterally against the palatal surfaces of the teeth, if there be any remaining. In the use of this appliance, a suitable palate plate having been selected and placed in position, the tray is filled with wax, inserted in the mouth, and an impression secured as with an ordinary tray. Then —great care being taken not to permit the tray to be moved from its position—with a *stout* plugging instrument, curved or turned at a right angle, pressure should be made against the projecting end of the bar until it will yield no further.

Bring the wax to a plastic state either by dry or wet heat, being very careful in either case not to overheat it, or produce the peculiar whitish appearance which precedes melting ; the wax is spoiled if heat enough is used to liquefy the surface. Water has the advantage of softening the wax more thoroughly and rapidly, and it can thus be worked up without adhering to the hands, which is an annoyance in the use of dry heat. An objection, however, to the use of water is, that more or less moisture is worked into the wax, destroying to some extent its tenacity. A dry heat makes it tougher, but more care is required to prevent it from being overheated. If water is used, a large bowl, with plenty of water, is desirable to secure uniform heating, and a thermometer should determine the temperature. Less than 120° will not suffice to make it as plastic as it should be ; over 130° will cause it to become adhesive. A better condition of the wax will be secured if it is allowed to heat up with the water. Of the two methods, there can be no doubt that careful dry heating will produce the best impression ; moreover, the wax will not be liable to leave the tray and remain in the mouth, as it sometimes does when wet heat has been employed. Whether dry or wet heat is used to soften, it must be thoroughly worked until all lumps are removed. Some operators are in the habit of softening the wax by warm water ; subsequently absorbing the moisture by working it in a dry napkin, and then bringing it to the desired plasticity by dry heat. This plan will save time when the wax is in mass.

It has been recommended that the operator should be governed by the condition of the mouth with reference to the softness of the wax. When the gums are uniformly spongy, the wax should be made quite soft ; but in cases where the maxillary ridge in front is soft and yielding, it is well to have the wax quite hard, so as to press it as closely as pos-

sible, otherwise the pressure in biting will force the plate up, and make it cant or rock on the hard palate.

Direct the patient to rinse the mouth with warm water before taking the impression, to remove the mucus. When the wax is in a soft, plastic state, it should be immediately placed in the tray, previously heated to secure adhesion, avoiding the use of too large a quantity (which is the usual error of beginners); the surface warmed, and promptly inserted in the mouth, care being taken to secure the proper position of the tray with reference to the ridge, so that no portion of the rim may cut into the soft tissues; it should then be gently but steadily forced up against the parts (passing the finger around the outside of the tray to permit the rim to pass up between the cheeks and gums without drawing the mucous membranes) until the ridge is completely imbedded, and the wax closely pressed against the palatine surface, and held there for a few moments to allow it to cool and harden. The tray should be held steadily and firmly, with the thumb and forefinger grasping the handle, and two or more of the fingers of each hand on the under surface at about the position of the first bicuspid, the operator standing to the right of, behind and over, the patient.

It is better to have the sides of the tray high enough to give the wax support at all points; but if any is pressed above the edges, it should be brought into contact with the gums by pressure of the finger against the cheeks or lip, so as to insure the filling of all depressions, irregularities, or interdental spaces. Special care should be observed in cases having a prominent ridge. The wax must be kept in the mouth long enough to cool and harden. To facilitate the hardening process, cloths dipped in ice-water, or a thin piece of ice wrapped in a napkin, may be applied to the under side of the tray, though there is some risk that the sudden reduction of the temperature of one side may cause unequal contraction. If there has been too much wax used, and the impression is injured thereby, trim off the surplus, dip into warm water, and introduce it a second time: this plan will not answer as well, however, in partial cases, as the teeth will not enter precisely where they belong in the impression.

Great care is necessary in withdrawing the impression. The partial adhesion by atmospheric pressure tends to draw the wax out of shape, as does also that produced by the adherence of the wax between the approximal surfaces of the teeth; the impression-tray must therefore be held perfectly firm, allowing no vibration in any direction until clear of the teeth. If the attempt be made to draw it forward, the wax will be forced out of form, and the impression rendered proportionately imperfect. Care must also be taken to have the tray sufficiently depressed to avoid abrasion by the teeth in its removal, the patient being instructed not to open the mouth too much, as by so doing the width is contracted,

and there is liability that the impression may be distorted in passing it through the lips.

If the impression should adhere tightly to the mouth, as is sometimes the case, its removal may generally be effected by withdrawing the tissues of the cheek, or lip, or by directing the patient to give a slight cough, or to blow through the mouth, which admits air, and so breaks up the atmospheric pressure; or, preferably, by having a hole in the centre of the tray, through which a blunt instrument may be passed up to the palate. Any little displacement of the wax which may thus be caused, will not be objectionable, because it will be in the spot where the air-chamber is required.

Immediately on the removal of the impression, it should be put into a bowl of cold water, or held under the stream of a hydrant, in order to restore its natural hardness, and thus lessen the liability to a change of its shape from handling.

To take an impression of the inferior ridge, a tray adapted to the case in hand having been selected, it should be filled flush with its margins, and introduced in the same manner as directed for impressions of the upper jaw, the operator standing either behind and to the right of the patient or in front. If behind, pressure should be made upon the tray with the thumbs about over the position of the bicuspid; counter pressure with the fingers under the jaw. If the position of the operator be in front, two fingers of each hand should make pressure upon the tray, while the counter pressure should be made with the thumbs beneath the jaw, which may be protected by a folded napkin. It is important to draw out the cheeks before making pressure upon the tray, as the soft tissues are apt to overlap the posterior margin of the alveolar border. The patient ought then to be requested to thrust the tongue out of the mouth as far as possible, so as to free the soft tissues from entanglement. Firm and steady pressure should thus be made, until the ridge is entirely imbedded, when the wax should be pressed around the margin of the tray into all irregular surfaces or depressions, especially against the overhanging ridge at the angles of the jaw.

Where there are teeth remaining in the mouth, a tray must be selected either of sufficient depth to receive them, or with a portion of the tray cut out, to permit the passage of the teeth.

GUTTA-PERCHA.

Gutta-percha has been extensively used, and is still highly esteemed, by some. One great cause, perhaps, of the difference in the estimate of its value by different practitioners, is in the quality of the article used. It is liable to undergo a marked change by exposure to the air, losing its toughness and elasticity; it is then very brittle when cold, and exceedingly sticky when warm. If of good quality, it is easily

made plastic by wet heat without sticking to the fingers; if it will not bear this test, it is not fit for use in taking impressions.

When of good quality, it will take a sharp and delicate impression, but is liable to change its shape when withdrawn from the mouth,—its tendency being to contract very decidedly on cooling. On this account it is used by some in special cases in which the plate is liable to be loose. Various suggestions have been made to improve it as an impression material by combining it with other substances, such as magnesia, or chalk. In such combinations it becomes harder when cold, is less sticky when warm, and less liable to contract in the process of cooling. It will take slight undercuts, and, in consequence of its elasticity, with less dragging than wax, but is apt to pass into narrow spaces between the teeth, and the force required to dislodge it injures the impression.

For taking impressions in gutta-percha, the tray should approximate the size and shape of the mouth, so as not to leave in one part more than another a superfluous thickness of the material, thus avoiding irregular contraction in cooling, and drawing or sucking in the act of withdrawing it. It should be well worked, and freed from bubbles; after which manipulation, the surface should be dried, and held for a few moments over a spirit-lamp, and put into a previously warmed tray. This will cause it to adhere to the tray, and so prevent withdrawal from the sides of it, in cooling. If it is desired to take advantage of its property of contracting, it may be dipped again in the water when ready for the tray, which ought also to be wet and cool.

While the impression is still in the mouth, the surface of the tray may be cooled with ice, or a sponge dipped in ice-water; but if the impression is a thin, delicate one, there is danger that the sudden cooling of one side may cause unequal contraction. Care should also be used not to make it too hard, when there are dovetail spaces between the teeth, or when the teeth themselves are wedge-shaped or conical. A little plaster batter pressed with the end of the finger into the spaces between the teeth, and allowed to set, will prevent wax or gutta-percha from entering. After the impression is taken, the plaster can be removed with an excavator. It is well to dip the impression into cold water immediately upon its removal from the mouth.

No oil or other substance should be put upon a gutta-percha impression before filling with plaster. To remove the impression from the plaster model, it should be put, when the plaster is hardened, into water, of a temperature from 190° to 200° , and allowed to remain until the gutta-percha is entirely softened.

PLASTER OF PARIS.

This material has now been over twenty years in general use for this purpose, and its merits are fully established. It requires nicer manipulation, and is not so cleanly as wax; but the results are so nearly certain, that they counterbalance any inconveniences attending its use. It is chemically a native sulphate of lime, found in great abundance in many parts of the world. In its crude state it is called gypsum, and is prepared for use by being reduced to a fine powder, and subsequently calcined in ovens at a temperature between 300° and 400° Fabr. If overheated, it parts with all of its water, and fails to recrystallize when mixed with water. This accounts perhaps for the imperfect solidification of some specimens of plaster. It is sometimes impure, by reason of original or subsequent admixture of foreign substances.

A difficulty may also arise if the plaster has not been ground sufficiently fine, in consequence of the setting taking place before the coarser particles have absorbed their quantum of moisture. In this case, the expansion, instead of taking place, as it should, while the plaster is soft, is continued after it has solidified.

When pure, properly ground and calcined, if mixed with water, a chemical union takes place, which is commonly called a "setting,"—the combining water condensing from a fluid to a solid, and liberating latent heat, as is usual in such changes, with a consequent elevation of temperature. This quality of setting depends, moreover, not only upon its original purity and correctness of manipulation in the manufacture, but largely upon subsequent care in keeping it, and the manner in which it is mixed for use. As it has the property of absorbing moisture from the atmosphere, it should be kept in a metallic, earthen, or glass vessel, perfectly covered, and in a dry, *warm* place. Frost injures its quality. Plaster which does not work well, by reason of the absorption of moisture from the atmosphere, may frequently be restored, by submitting it, in a dish or other vessel, to the ordinary temperature of the baking oven of a cook-stove until it is thoroughly warmed through. It will not work satisfactorily if cold.

Presuming that it is a pure article, has been properly calcined and ground, and carefully kept, the next item of importance is, that it be properly mixed. It should be passed through a sieve of bolting-cloth previously to being used. Warm, soft water is the best, if it is desired to have it set quickly. The temperature of the water used will decide largely the time required for its solidification. There is less liability of air-bubbles if warm water is used. The quantity of water used will also determine the period required for the setting; the less water the quicker it will set; but plaster mixed stiffly will always contain bubbles.

The best method of mixing, is to take the required quantity of water

(easily determined by experiment), sprinkling the plaster into it, until of sufficient consistency; if the reverse plan is pursued—the water poured into the plaster—it will crystallize unequally, and be filled with air-bubbles. A teacup or bowl is the best form of vessel to mix it in. Thorough stirring or beating makes it tough and pasty. The longer it is agitated and beaten, the less subsequent expansion there will be, for the reason that each granule becomes saturated (satisfied) before solidification takes place; whereas, if too little water be used, or the plaster is allowed to set, before the centre of the granules is saturated, they will continue to absorb from their surfaces, and expansion will continue with some plaster for a considerable time.

To facilitate the setting, many different substances have been recommended, such as salt, alum, sulphate of potassa, silicate of soda (liquid silex), etc. Of these, the alum and silicate are unpleasant in the mouth, and the latter is unreliable, making the plaster set too quickly, while the sulphate does not appear to possess any superiority over common salt (except that a very small quantity suffices, and in making models it causes no efflorescence). A small pinch is all that is required for an impression; an excess will cause too prompt setting, and will effloresce, and make the impression rough on the surface—the tendency to which, however, will be obviated by promptly varnishing it after its withdrawal. A *large* excess of salt will retard the setting. The varying effects of different quantities are shown in the following results, obtained from a single sample of plaster, the quantity of water and plaster being in each case the same: The plain plaster set in five and a half minutes. The addition of two grains of salt caused it to set in five minutes, of four grains in three and a half minutes, of eight grains in three minutes, of sixteen grains in two minutes, of thirty-two grains in one minute, of sixty-four grains in two and a quarter minutes, of one hundred and twenty-eight grains in eight minutes, and a saturate solution required twenty-four minutes.

The practice of some is to add the salt to the water; others consider that the best time for adding it is when the plaster is ready for use, and just before it is put in the tray—the salt thus beginning to act as the plaster is introduced into the mouth, allowing the use of a thinner batter, and yet insuring a speedy setting. The addition of the salt prevents the plaster from becoming as hard as it otherwise would; but for impressions this is not an objection.

Plaster should not set too rapidly, nor should it be too long in hardening; but if a choice has to be made between the two conditions, the latter is to be preferred, for the reason that the slow-setting plaster gives the operator ample time for preliminary management. He should never be hurried, and this is likely to be the case in quick-setting plaster. This is of more importance than is generally considered. If it

is desired to retard the setting, a solution of white glue, sugar, molasses, or vinegar may be added to the water with which the plaster is mixed.

A difficulty has been raised in regard to the expansion of plaster in the process of recrystallization or setting. That it does expand is not questioned, but as it is only about $\frac{1}{500}$ of its own measure, it is not sufficient to interfere materially with the success of an artificial denture. It is claimed, and if true it is a curious fact, that it expands less or not at all when salt has been added.

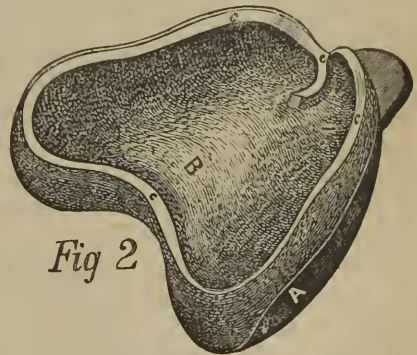
Some always take an impression first in wax, giving it a lateral, anterior and posterior movement in the mouth, or subsequently enlarging it by cutting, so as to give space for the batter of plaster with which the final impression is afterwards taken. This method is specially applicable when the mouth is not uniformly hard,—in some places soft and yielding,—the object being to allow trimming off the impression corresponding to those places where the tissues are yielding, in order that a greater depth of plaster may be brought into contact with them, which, being softer than the wax, will allow them to retain their relative normal positions. After the wax impression is taken for this purpose, the surplus wax should be trimmed off, and the surface scored, to make retaining-points for the plaster. To prevent the wax from leaving the tray, its surface should be warmed over a spirit-lamp. The required quantity of warm water may then be taken—say two tablespoonfuls—in a teacup; and plaster sufficient to make a batter about the consistency of thick molasses should be *sprinkled* in. If put in carelessly, it will become lumpy, and may prove disastrous to the impression. A newspaper covered with a towel should be spread in the lap of the patient to receive any excess of plaster which may be dislodged, and so prevent the clothing from being soiled.

The patient may be directed to dry the mouth with a soft napkin if there is an excess of saliva; but it is rarely if ever necessary in taking impressions of the upper jaw, and some mouths are naturally so dry that the difficulty is rather to prevent the plaster from adhering too firmly to the tissues. In such cases, it would not be well to absorb what little moisture there might be. Some operators always direct the mouth to be rinsed with warm water, which, it is claimed, by removing the mucus, facilitates a more even flow of the plaster; diminishes its liability to an undue adherence to the membranes, and produces a smoother and more delicate impression. Some always brush the parts over with glycerin if the mucous membrane appears abnormally dry. A pinch of salt should now be sprinkled into the batter and well stirred, and as soon as it shows signs of setting, transferred to the wax impression, introduced into the mouth, pressed firmly, and held in position until the plaster sets.

Dr. A. Westcott recommends the following process for taking plaster impressions for entire superior dentures :

“The main difficulty in taking impressions with plaster consists in the fact, that the material used is a *semi-fluid*, and hence is not capable of imparting to the hand sufficient sensation to govern the movements of the operator, or to indicate to him precisely what he is doing. He is therefore liable to imperceptible movements, of which he is neither warned nor advised by any resistance of the material used. To obviate this difficulty, I uniformly take a wax impression as a preliminary step, and with as much care as if I expected to use it to form the model. This wax, when quite cold, I carve with knives curved laterally, and with bent gouges, with great care, as follows: after deciding as to the proper form and size of the impression, and in a general way trimming off all the wax which is not needed, I make a cut in the wax one-eighth of an inch deep, on the inside of the impression, and about one-eighth of an inch from the margin. This cut follows the entire margin of the wax impression, and across the palatine portion. I now carve out the entire surface of the wax to the depth of from one-eighth to one-quarter of an inch, except a narrow strip, perhaps one-quarter of an inch wide at the extreme front, and at the place of greatest depression in the wax. When this impression is replaced in the mouth, it rests firmly upon the unchanged strip running across the rear end of the palatine arch, and at the same time bears upon the uncarved strip at the front of the impression. The impression, after it is carved ready for the plaster, is represented in Fig. 2, in which B represents the carved portion, and *c c c* the line or portion of the wax left uncarved, or as it was formed by the mouth.

I hardly need say that an impression having these resting-points could be held steady, from pressure bearing upward against the centre of the impression-cup, nor that it might be steadily held there a time sufficient for the plaster to set—even in spite of the patient. But without some fixed resting-points against which the cup containing this semi-fluid mass may be carried and held, I regard the



chances wholly against getting a perfect impression. By such prearrangements you will be able to use the plaster paste comparatively thin, which I regard as very desirable, if not absolutely indispensable.

Under the conviction that it may be more definitely governed by the hand, and the feeling that it is desirable to have the plaster in the mouth

as little time as possible, I am satisfied that operators too often use the plaster paste too thick, or, what is much worse, after it begins to thicken by setting. In either case, and especially if a simple impression-cup without wax is used, a rocking impression is almost inevitable. The broad and sometimes nearly flat surface of the impression-cup compresses the plaster immediately above it, causing the central portion to harden soonest, thus forming a pivot or fulcrum, over which the impression is easily rocked or tilted. This result is effected by the surplus water being squeezed out of the centre plaster, and is imparted to that forced to the sides of the impression."

If the impression is to be wholly of plaster, the mouth should be carefully examined, and the proper tray selected; if it is a high arch, the centre of the tray should be filled up with wax, and with the same material any deficiency in the size of the tray at the back part or around the outside edge should be supplied. Many failures are unquestionably attributable to a want of support in the summit of the arch, admitting the too great bulk of plaster to drop before solidification takes place; a difficulty obviated by having a smaller quantity of the batter sustained by a dome of wax. Some operators recommend a rim of wax to be carried entirely around the periphery of the cup, including the posterior margin; the object being to enable the operator to press in the plaster above the alveolar border, and to prevent, in part, its being forced too rapidly or in too large quantities over the posterior margin; but care should be taken that this rim be not deep enough to press unduly upon the soft palate, and distort the impression.

If the alveolar ridge is very deep, or presents the form of a fissure, making considerable space between the tray and the floor of the palate, the tray should be driven up on a mould, so as to make it correspond with the form of the mouth; otherwise the plaster will not be carried to the deepest portion of the arch, and thus there will be an imperfect impression of the palatine surface. Another plan is to take up a small portion of plaster on the finger or a spatula, and apply it to the deeper parts of the arch just prior to the introduction of the tray; the patient being already seated, with a slight inclination of the body forward.

The filling of the tray should be commenced before the plaster has set to the point suitable for insertion in the mouth. Sufficient should be used to insure the filling of all spaces, with a small quantity to spare. A knowledge of the amount necessary can only be acquired by experience; too much makes it difficult to insert, and will also cause a larger amount to be forced over into the mouth,—a result always disagreeable to the patient and unpleasant to the operator. The rule generally given, to wait until the plaster fails to fall from the spatula, is an error. It is then too stiff to put into the tray; allowance must be made for the

time required to place it in the mouth. So long as the surface glosses, when smoothed with the spatula, and does not begin to leave sharp edges, it will take a perfect impression with *very moderate* pressure. The perfection of the impression will mainly depend on its insertion when the smallest possible pressure will be required; but if too thin, difficulty will be experienced by its spreading and running from the tray.

When the tray is introduced into the mouth, it should be passed up to the palatine arch, touching the posterior of the palate first. This is to throw all excess of plaster anteriorly. It should then be brought gently up over the anterior surface, until the parts are completely imbedded and the plaster is seen to protrude around the margins of the tray, and held there with no more pressure than will suffice to keep the tray in place until it sets. The danger of having an excess of plaster pass backward toward the pharynx cannot be overstated. It is astonishing that no accidents of a serious nature have occurred from this cause. It not unfrequently happens, when the tray is pressed anteriorly first, that a large excess will pass over and interfere with respiration. This excess is liable to fracture when hard, and, becoming loose, may pass into the pharynx and endanger the patient. To obviate this, it has been suggested to place around the palatine surface of the tray pieces of string, extending slightly beyond the posterior margin, which, becoming imbedded in the soft plaster, will draw out any portion that may become loose. This precaution is, however, unnecessary, if care is taken not to use an excess of plaster; to bring the posterior portion of the tray first into contact with the palate; to have the patient lean well forward, and breathe through the nostrils.

The patient should be seated,—a common chair is preferred by many operators,—and instructions given as to position and the reasons therefor; the patient inclining the body slightly forward, and in readiness when the plaster is introduced to throw the head still more forward,—the object being to determine any excess of plaster to the front of the mouth, and prevent it from falling into the fauces. Too many directions and an ostentatious preparation will, however, cause failure with timid patients, by inducing undue nervous irritability. When the tray fairly covers the ridge, a slight vibratory motion should be given to it to settle the plaster and dislodge any bubbles of air; at the same time the head of the patient should be thrown well forward and the body still more inclined. The formation of air-bubbles in the roof of the mouth cannot be thus prevented, but must be guarded against by having the plaster high enough in the centre of the tray.

When the alveolar ridge is much absorbed, the foldings of the mucous membrane should be prevented from becoming involved, by pressing them out with the fingers. The tray should be retained in *exact* position with great care until the plaster sets. The operator should always hold

the tray, never trusting it to the patient. It should be retained in position, not by the handle, but by one or two fingers of the operator's right hand upon the centre of the tray, with his left hand resting upon the patient's head.

To judge when the plaster is hard enough to remove from the mouth, the evolution of heat, as the result of the chemical action which has taken place, will be a guide. It has been recommended to test by the fracture of the plaster left on the edge of the bowl in which it has been mixed; but, while some say that the secretions of the mouth feed the plaster and prevent it from hardening as soon as that in the bowl, others contend that the heat of the mouth causes it to set somewhat quicker. The safest plan, therefore, is to test that on the edge of the impression, or to know by previous trial the "behavior" of the plaster used, and determine by the *watch*.

On withdrawing the tray from the mouth, the upper lip should be stretched upward, at the position of the second bicuspid, with the left hand, so as to admit air between the plaster and the gum; at the same time the tray should be pressed down with the right hand. If the plaster is left in the mouth too long after it hardens, there is likely to be a very strong adhesion of it to the mucous membrane, owing to the absorbing property of the plaster. In such cases no undue force should be used in the withdrawal, as there is liability to tear the membrane; the only plan is to *coax* it out. The tissues of the lip and cheeks should be lifted alternately, and, if necessary, the patient directed to give a slight cough; or, make upward pressure upon the handle of the tray, which will depress it at the heel; or, with a suitable instrument, the soft palate should be pressed up to admit the air; or, preferably, through a hole in the centre of the cup, a blunt instrument may be passed up to the palate, and thus admit air between it and the impression. By this means there is less danger of injuring the impression than by introducing air at the sides, which can only be done by more or less depression of the tray. These means will generally, with a little patience on the part of the operator, effect its removal without damage to the mouth or to the impression. A pair of foil pliers should always be at hand, to take out of the mouth any pieces of plaster which may break in the act of withdrawing the tray. These should be rinsed clean of saliva, and replaced, after hardening, with great care and nicety.

Dr. C. S. Chittenden recommends the following plan for making a tray for special cases: "I first take an impression in wax and draw a cast from it; then I take a piece of sheet-lead and fit it to the cast as nearly as possible, by rubbing down with burnishers, something like a trial plate, leaving it a little higher on the edges than a plate which is to be worn would bear to be. I use this lead pattern or trial plate, or

whatever any one may choose to call it, for an impression-cup; but as it would not be stiff enough to answer that purpose of itself, I punch some small holes through the lead, and pour plaster of Paris over the whole lingual surface, letting it run through the small holes in the lead, so as to bind the plaster firmly to it in the same way that mortar is bound to the lath on walls and ceilings. When the plaster has set, I cut away all that will be in the way, and having prepared the plaster for the impression, I pour it into this made-up cup, and, putting it into the mouth, I press it home in the usual way."

Dr. J. F. Leaming proposes the following method of taking upper impressions with plaster without a tray:

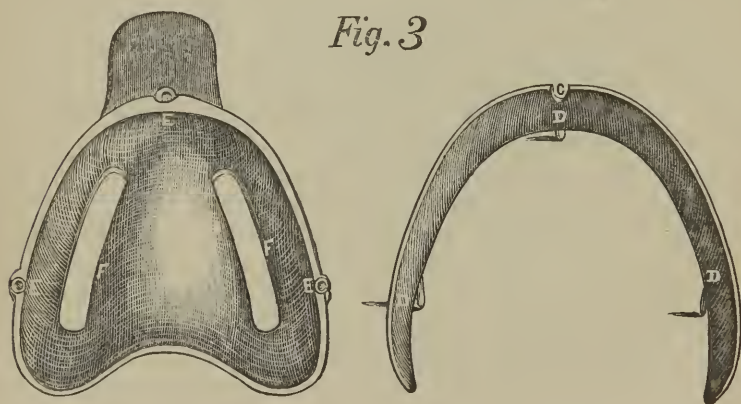
"The process is simple. It requires less time than the usual method, gives perfect results, and is, in a large majority of cases, preferred by the patient; avoiding the unpleasant, and sometimes painful, distention of the mouth, unavoidable when introducing the cup. A clean bowl for mixing the plaster, and a spatula of polished steel, or, better, of silver, three-quarters of an inch wide, and slightly flexible, are the only fixtures necessary. The perfectly polished surface of the spatula is essential, as otherwise annoyance will be experienced from the adhesion of the plaster to the instrument,—best remedied, when it occurs, by dipping the spatula into water. Let the patient be seated in the ordinary operating-chair, the head slightly inclined backward. If the patient is liable to nausea or retching, it will be greatly mitigated by keeping the head nearly erect, and breathing through the nose. After carefully examining the mouth, mix a sufficient quantity of plaster (of any good variety, if fine and strong) to the consistence requisite to pour into a mould, adding a little salt, if necessary, and stirring constantly, until it gives evidence of setting. When it will not readily fall from the inverted tray, it is fit for use. Care should be taken not to delay too long, as better results are obtained while the plaster is quite thin. Distending the mouth slightly with the left hand, introduce the plaster quickly, but not hurriedly, upon the point of the spatula, first covering the arch until overfull, then upon the buccal aspect of the gum, beginning posteriorly on both sides, and finishing anteriorly, pressing the plaster carefully to the gum, in front, with a napkin. Remove, by first pressing the impression at the sides carefully downward. If any portion of the rim is imperfect, trim down as far as needful, wet the impression, reapply it to the mouth, and build up with fresh plaster."

In taking impressions for partial cases, to prevent difficulty in the withdrawal of the impression, the shape and position of the teeth should be carefully noted, and manipulations made accordingly. Before taking the impression, undercuts, etc. should be looked for, which must serve as a guide in the withdrawal of it. Where the teeth are wedge-shaped, or conical, or straight and short, there will be no difficulty;

but where they are long, or inclined, or where the necks are smaller than the crowns, they will not deliver without fracturing the plaster. In some cases a little wax, pressed into interdental spaces, may serve a good purpose by preventing the plaster from entering. The impression should be removed from the mouth, either before the plaster has set so as to make it liable to fracture, or else allowed to remain until it is sufficiently hard to make a clean fracture. There is danger, however, if there are loose teeth in the mouth, of extracting them in the removal of the impression.

In such cases it has been recommended to dry the teeth, and put a cylinder of wax around them; and, if great care and nicety is observed, this plan will give good results. It has also been suggested to take pieces of raw cotton and place in the tray where the teeth will strike, and run some thin plaster over it in the form of batter. This will prevent the plaster from breaking up into such fine particles as it otherwise might.

Dr. A. Westcott thus describes a plan for taking impressions for partial cases with plaster:



“To secure this object, the impression-cup is made in two parts,—the rim D D D, Fig. 3, is separate, or detachable from the body of the cup. Such a cup may be easily prepared from the ordinary cup by sawing off the rim with a fine saw, and again coupling it with the palatine portion by brass dowels. Take the rim and solder on to it three short pieces of brass wire,—one on the front and one on each side of the rim, as at D D D. Next, solder on three short pieces of brass tubing, represented at E E E, corresponding in position and in size of hole with the wire dowels already soldered on to the rim. By this arrangement we are enabled to remove and replace the rim at pleasure.

As it is very desirable to bring away the wax and plaster with the

palatine portion of the cup, provision must be made against the cleavage of the wax from the cup. This may be done by holding the cup over a spirit-lamp, and securing an adhesion by melting the wax; but a much easier way is to perforate the base of the cup, as seen at F F. In taking the wax impression preliminary to the plaster impression, the wax will press through these orifices more or less, and by spreading it out like the heading of a rivet on the bottom of the cup, we have a strong and secure holding when the wax is cold.

These orifices will be found a convenience in any case of plaster impression-taking. When the two parts of the cup are placed together, so as to form a cup of the usual form, and the wax impression taken, and curved, as above described, I then pass a thin blade through the seam or joining, and separate the wax so that both rim and wax may be easily taken from the lower or palatine portion of the cup. In this way we may insure the separating of the two parts on this line, leaving all, both plaster and wax, within the rim in the mouth, while the palatine portion is removed. To remove the portion embraced within the rim easily, and without unnecessary crumbling, spring off first one end of the rim and then the other, and remove the rim from the mouth. Then, by a thin, though not sharp, knife, or firm spatula, divide the plaster, which is still in the mouth and outside the teeth, into three sections, which may generally be removed without breaking it elsewhere, and in a way that the pieces may be readily returned to their proper places. There may be *cut-offs* of wax placed where we desire the plaster to separate, so that the sections are very easily removed. These cut-offs consist simply of thin plates of wax set up edgewise, so as to divide the plaster while thin into any number of sections, and reach from the rim of the cup to the teeth or gum.

In taking an impression where there are teeth and spaces of naked gum between them, and especially where the teeth are bell-crowned, it is well to set up thin slips of wax from tooth to tooth, or else leave such cut-offs, when curving the wax, to make room for the plaster. In taking impressions for partial sets, there is not the same necessity for providing against the rocking of the impression-cup, as the depressions made by the teeth in the wax are not obliterated by the curving, and these will serve as the steadying points when the wax is returned with the plaster for the final impression. By carrying out these suggestions, we may have no more difficulty in getting a perfect impression of *every part* in mixed cases than pertains to full sets where the gums are entirely naked."

Dr. W. N. Chaffee suggests the following plan of taking a perfect impression in plaster for a partial set, when the remaining teeth are long, and have large crowns, small necks, and incline towards each other:

“Take, for example, a case of the superior central incisors and bicuspids. I prepare my plaster as in other cases, having near at hand warm water for mixing it. Select an impression-cup of suitable dimensions, preferring one with a square turned rim, instead of an oval one, as it accommodates the teeth much better. Prepare the cup by bridging across the back edge with a thin strip of wax not thicker than a knife-blade, to prevent the plaster from dropping over into the throat.

I then soften some wax in warm water, making it as soft as possible without melting, and roll it out into a stick as large as my little finger, and long enough to pass around on the inside of the border of the cup, from heel to heel. Heat the cup over a spirit-lamp sufficiently to attach the wax to it, and lay the wax in around the border. The principal point to be observed in this method is expedition. After placing the wax in the cup, the plaster, mixed with warm water, in order not to chill the wax, should be placed in the cup, and introduced into the mouth as quickly as possible, while the wax is in a plastic condition.

Having my patient seated in an ordinary chair, and standing at his side, I pass my left arm over the head, and hold it firmly in an upright position, to prevent any plaster from dropping into the throat, should any happen to fall over the back of the cup; with the right hand introduce the cup, press it well up, and hold it firmly until the plaster hardens. The wax takes the impression of the teeth very kindly, and the plaster gives a perfect impression of the whole palatine surface.”

Dr. Charles J. Essig suggests the following plan of obtaining impressions of difficult partial cases; but it is not applicable where interdental spaces are frequent or large :

“An impression-cup should first be selected of the proper size and shape,—those with the flat floor are best for partial cases; the plaster should be mixed thin, almost as thin as water, adding chloride of sodium to facilitate setting. Plaster mixed in this manner does not become as hard and unyielding as that mixed merely to saturation. Now oil the cup, so that it will readily separate from the impression when hard; fill the cup as soon as the plaster thickens sufficiently; then, with a small spatula, place a layer of the soft plaster in upon the palatine surface; otherwise by inclosing the air in the deep portion of the arch the accuracy of the impression may be impaired. After this precaution, the cup is placed in the mouth, and gently pressed up until its floor comes into contact with the teeth. When the plaster is sufficiently hardened, remove the cup—which, from its having been oiled, is done without difficulty. With the thumb and index finger break off the outside walls. The portion covering the palatine surface is then removed by the use of a blunt steel spatula, curved at the end in the form of a hook. The

pieces are then placed back into the cup, where they will be found to articulate with a perfect accuracy."

The late Dr. Bean, of Baltimore, recommended that a wax impression should be taken, from which dies must be prepared; a metallic plate swaged, on which from ridge to ridge a strip of metal should be soldered. Between this and the plate he passed a stick, to serve as a handle in removing the impression. Then, after heating the plate, he coated the palatine surface with shellac, and upon this placed a thin layer of raw cotton, which, adhering to the resin, and permeating the plaster batter, when poured on, prevented the thin impression from breaking up into fragments.

A professional friend adopted the following method of obtaining an impression in a difficult case:

A patient, wishing the insertion of a lower denture, presented a mouth offering serious obstacles to the procurement of a correct impression, among which may be enumerated a broad jaw associated with a contracted oral opening; the presence of two teeth upon either side, a cuspid and molar, which, inclining towards each other, inclosed interdental spaces of dovetailed form, and the teeth were of that bulbous configuration consequent upon an extensive absorption of the supporting structures. All of the customary plans for obtaining a cast were employed without success, but a satisfactory model was finally secured by the following process:

An impression in wax was at first taken, from which the plaster cast was made, and the teeth removed as usual; but before imbedding in the sand the entire surface was evenly covered with sheet wax one-eighth or one-fourth of an inch in thickness. When the metallic models were made, a plate of ordinary tin or tinned iron was struck for an impression-cup; perforated to permit the teeth to pass through, and a handle soldered to stiffen the appliance and facilitate its introduction into and withdrawal from the mouth. The tray so constructed was adjusted to freely slide over the remaining teeth, its interior *thoroughly oiled*, and small pieces of wax placed over the apertures to prevent the batter from escaping while inverted. Thus filled, it was placed in position (the teeth readily displacing the loosely applied wax over the openings), and allowed to remain until the plaster had sufficiently solidified, when it was removed, leaving the hardened plaster to be carefully extracted in sections and replaced in proper position in the cup.

The success of this method will be largely, if not wholly, dependent upon the use of a *stiff* and *unyielding* cup, which shall not bend or spring from the application of the requisite force.

Prof. Austen designed a gutta-percha cup, which is thus described in "Harris's Principles and Practice of Dentistry:"

"These cups were originally devised to meet a difficulty incident to

vulcanite partial pieces. Perfect impressions of dovetailed interdental spaces, and the lingual side of molars and bicuspid, often undercut, are impossible in wax or gutta-percha. Yet Prof. A. regards this as essential to the proper construction of a partial vulcanite set of teeth.

They are thus made: take a wax impression and make a model; in partial cases, brush over the teeth of the model one or two layers of thin plaster, to fill up all undercuts, and to make the plate fit loosely; saturate the model with water, and mould over it a gutta-percha cup. This last is done, not by using the gutta-percha in sheet, but by first making into a ball, then working it from the palate outward, leaving a thick mass in the centre. It should be, on the inside, from one-fourth to one-half of an inch thick, so as to be stiff and unyielding; but on the outside not more than one-eighth or one-sixteenth thick, so as to be slightly elastic and yielding. The whole inside of the cup must be roughened up with a scaler or excavator, in such a way that the plaster can take firm hold. In most partial cases, the impression will have to be removed in sections; the inside remaining entire, but the outside and the parts between the teeth coming away separately. In certain cases, it is necessary to partially cut through the cup before putting in the plaster, and usually upon the thick masses of gum which fill the interdental spaces. A cut on the inside, in line with the ridge, gives pliancy to an otherwise rigid cup, and permits its easy removal. When it is desirable to extend the cup around the entire arch, so as to get an exact plaster impression, not only of the gum but of all the remaining teeth, this rim of gutta-percha must be slit at two or three points, to give that pliancy which is a chief merit in this form of cup. These cups have no handle, but are removed by inserting a plugging instrument into a small hole previously made in the back part of the cup where it is thickest."

Various plans have been recommended for taking impressions of difficult partial cases. Some prefer the following:

Having taken an impression in wax, a metallic die and counter die are made, as for ordinary plate-work. From this a plate of brass, tin, or zinc is struck up, to be used as an impression-cup, the palatal surface of which is coated with a thin batter of plaster, and applied to the mouth in the usual manner. Others prefer taking a wax impression, from which all those portions indented by the teeth are subsequently cut away, allowing only so much of the wax surface to remain as corresponds with the artificial base to be supplied. This is subsequently employed as a tray with which to take a plaster impression.

In taking impressions of the lower jaw, it is necessary to allow the plaster to set until it will not drop from the inverted impression-tray

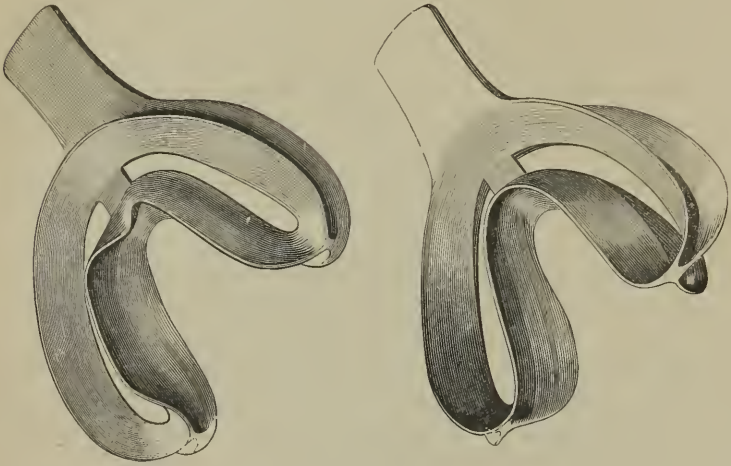
It should be then placed in the mouth, and carefully depressed at the posterior portion first. When there is an excess of saliva, care should be taken to have the mouth of the patient dried with a soft napkin. After filling the tray flush with its margins, the operator should introduce the tray into the mouth in the manner heretofore described, standing to the right and back or in front of the patient. If the latter position has been chosen, after having adjusted the tray properly over the ridge, the first two or three fingers of each hand should be placed upon the top of each side of the cup, over the position of the bicusps, and the thumbs underneath the jaw, steady and firm pressure being made until the ridge is wholly imbedded, the patient sitting in the position recommended in taking upper impressions. If the operator stands behind the patient, pressure should be made upon the tray with the thumbs, and counter pressure with the fingers under the jaw, care having been taken to draw out the cheeks before making pressure upon the tray, as the soft tissues are apt to overlap the posterior margin of the alveolar border. The patient should then be requested to thrust the tongue out of the mouth as far as possible, so as to free the soft tissues from entanglement. To remove the tray, press the finger of the left hand against the inner surface of the cheek, outward and downward, so as to admit air under the impression.

In middle life, or in old age, where there has been great absorption, the muscles of the mouth are on a line with, or sometimes higher than, the maxillary ridge; the outer edge should then be turned out at a right angle with the body of the tray. If the edges of the tray are too straight, or the two sides are in nearly parallel lines with one another, the outer edge presses the muscles down over the maxillary bone, and when the reverse is taken from it, there will be a sharp-ridged cast; and when the plate is made to fit, the edge will cut the muscles, and make a sore mouth. But by using a tray with the outer edge turned out, so as to drive the cheek out, the muscles are drawn on a line where they are connected with the ridge of the jaw, and more in their natural position. When a plate is made, the muscles will have a free play under the edge of the plate, and will not lift it from the jaw and float it around the mouth.

Dr. B. W. Franklin devised a cup for taking impressions of the inferior ridge, which he thus describes: "This cup, or rather double cup, has a groove or space in its centre all the way round. The advantages of this groove are,—that when the lower part of the cup is filled, and the upper part one-fourth full of plaster, and placed in position over the ridge, the operator, with the end of the finger or other suitable means, can gently agitate the whole mass of plaster in the cup, and thus prevent air-bubbles, blanks, or other imperfections on the surface of the impression. The peculiar shape of the outer

flanges of this cup is such as to distend the cheeks, while the lower inner edges, pressing upon the submaxillary and sublingual glands, depress them sufficiently to prevent any folds or ligamentous attachments from being embraced by the impression."

FIG. 4.



Dr. B. F. Rosson's plan of taking impressions is thus described by Prof. Taft in the *Dental Register* :

"The principle consists in obtaining an impression only of the parts upon which the plate is to rest; this is done by using for the lower jaw a very narrow impression-cup, and almost flat instead of deeply concave, as they usually are. This may be bent so as to partake as nearly as possible the form of the ridge of the jaw. A sheet of softened wax is then put upon the cup or holder, and pressed upon the jaw till a good impression is secured; then trim down the wax just to the size the plate is to be; now use this for the plaster impression-cup; a very small portion of plaster properly prepared will be sufficient to obtain a very perfect impression. The plaster should at no point be permitted to pass much beyond the proposed border of the plate; this is to prevent pressing and distending the soft tissues on both sides of the ridges; such distention usually draws the mucous membrane of the gum out of position. Immediately after the cup with the plaster is placed on the jaw, the tongue should be raised above the cup and kept there till the plaster has set.

The cup for the upper jaw should not extend much beyond the ridge all round, so that the same principle is observed as described for the lower."

The model should be taken before the plaster impression becomes dry, being previously coated with something to prevent the adhesion of

the plaster,—a solution of soap, a thin wash of collodion, or sandarac or shellac varnish. The solution of soap is made by adding an ounce of white Castile soap in powder or shavings to a pint of water, and heating it until the soap is dissolved. It should then be bottled, and poured out as needed for use, avoiding using it from the bottle, as it is rendered turbid by contact with a brush that has been used on plaster. Soap is best on a very moist impression; collodion or varnish on one partly dried. If the impression has become very dry, it is necessary to saturate it with water before pouring the plaster for the model. If varnish is used, oiling the surface after it becomes dry will insure the separation. The latter plan of varnishing the impression with an alcoholic solution of sandarac or shellac is strongly advocated, as the coloring matter by penetrating a short distance affords a guide in separating the model, and thus diminishes the liability to fracture or mutilate the cast—an accident often occurring where there is no line of demarcation, and one is obliged to rely upon his mental outline of the case. The water with which the plaster is mixed for taking an impression is sometimes colored for the same purpose by the use of a few drops of a solution of carmine, or by the addition to the dry plaster of a small quantity of venetian red or vermilion. Enough of either to answer the purpose is not detrimental to the plaster, and gives it an appearance pleasant to the eye of the patient.

PORCELAIN TEETH.

[THE following chapter on Teeth is taken by permission from the new edition, just issued, of "Harris's Principles and Practice of Dentistry," edited by Professor P. H. Austen.

Some additional illustrations have been introduced, accompanied by the necessary description. These additions have been submitted to the author, and met his approval.]

As Pharmacy was once a part of Medical practice and instrument making a part of Surgery, so the manufacture of Porcelain teeth was, at one time, confined to the dental laboratory. Until within the past twenty years, a practical knowledge of the Dento-ceramic art was considered an essential part of dental education. Galen compounded his celebrated *Theriaca* for two Roman Emperors; Paré and Wiseman made many of their surgical instruments; and necessity has compelled physicians and surgeons in all ages to imitate these examples. But the medical and surgical world have, for many years, committed the manufacture of drugs and instruments to those who, by making it a special art, can produce far better results.

The time has fully come when Dentistry should do the same with porcelain work, for two sufficient reasons: 1. Manufacturers now offer to the profession porcelain teeth, in such variety of beautiful forms, that not one dentist in a thousand could equal them. 2. Moderate proficiency in block-carving requires such an amount of preparatory training and of continuous experience, that the dentist's education and practice must suffer, in the line of important duties, which cannot thus be delegated to others. Hence nearly, if not quite, all of the most skilful block-carvers, engaged in the general practice of dentistry, have, since the year 1850, one after another, given up this art, which it cost them so much to acquire. For these reasons, and also because the management of a porcelain furnace cannot be taught in books, we shall not attempt in this chapter to give a full and didactic exposition of the manner of making porcelain block or single teeth. Those who desire such knowledge, with a view to making it a specialty, require that

which it no longer comes within the scope of a work on the "Principles and Practice of Dentistry" to teach.

There is, however, on the part of all students, and probably of most practitioners, a desire to know the composition of dental-porcelain, and to have some idea of the manner in which a few earthy materials and metallic oxides are made to assume such beautiful forms. Some knowledge of the component parts of porcelain is essential to a correct understanding of the necessity for their admixture, as well as of the effects thus produced.

PORCELAIN MATERIALS.

The infusible earths Silica and Alumina, and the fusible alkalies Potassa and Soda, form the bulk of all porcelain. Certain Metallic oxides, in small quantity, give color, and some varieties of pottery are modified by small proportions of Lime and Magnesia. Dental-porcelain is made from the purest compounds of silica, alumina, and potassa, colored by metallic Gold and Platina, and by the oxides of Gold, Titanium, Manganese, Cobalt, and Uranium.

SILICA.

Silica (quartz, silex, silicic acid) is, next to oxygen, the most universally diffused substance in nature, constituting fifty per cent. of all rocks. Granite, gigantic rocks, sandstones and sand contain not less than three-fourths silica: mica-schist, clay-slate and clay, not less than two-thirds: trap rocks and lava, one-half. Silica is to the mineral kingdom what carbon is to the vegetable—the element of stability. In its purest forms (rock-crystal, Brazilian pebbles, or crystals of quartz), it is free from discoloration by iron, or other oxides; it is absolutely infusible, and is insoluble in water: this is the kind selected for dental-porcelain, but for other varieties of porcelain, flint is commonly used. It forms silicates with alumina, magnesia, lime, potassa, and soda: the most important of which, in this connection, are the silicates of alumina and potassa. Silica, as found in feldspar and kaolin, is partly pure silica, partly the silicate of alumina. Now the "behavior," in the furnace, of silica and the silicate of alumina is different: hence, chemical analysis can estimate only the relative purity of these substances; experiment alone can determine the proportions of each necessary for the development of any required property in porcelain.

FELDSPAR.

Next to silica, alumina (oxide of aluminum) is the most universally diffused of all minerals; but, unlike silica, it is rarely found uncombined. The gem Sapphire is pure crystallized alumina, and is the next hardest mineral to the diamond: a less pure form is well known in dentistry, as emery or corundum; some specimens of which seem, under

the lens, to be a collection of minute crystals of dark-colored sapphire. For porcelain manufacture, alumina is never used in its pure state, but in its natural combinations with silica, lime, potassa, and soda. For dental-porcelain only two of these are used—Feldspar (known to the Chinese as *Pe-tun-tse*) and Kaolin. Feldspar is a silicate of alumina and potassa, containing a little lime and a trace of iron. A less common variety of spar contains soda in place of potassa: it makes a soft porcelain, fusible at lower heat than the potash-spar. Lime-feldspar is used in some kinds of pottery, but for dental purposes potash feldspar is the only variety. It is an abundant mineral, and is often found in large masses; the purest varieties alone are used for dental-porcelain: Delaware and Pennsylvania spars are most esteemed by American manufacturers. Its most extensive dissemination, however, is as one of the components of granite and granitic rocks, by disintegration of the feldspathic constituents of which, large beds of porcelain clay are formed, as found in China and Japan, England, Germany and France, and also in the United States.

KAOLIN. *Ka-o-lin* (the Chinese word for clay) is the purest of these mixtures of silica and silicate of alumina, prepared in Nature's laboratory, for the manufacture of porcelain. Pipe-clay, potter's-clay, blue-clay, fire-clay, and Cornish-stone are similar in composition, but only the purest kaolin is used for dental-porcelain. It contains nine parts of silica and eight parts alumina; whereas spar has nine parts silica and only two parts alumina; also spar is made fusible by its silicate of potassa—kaolin has none. Kaolin is therefore feldspar, deprived of its soluble silicate of potassa (or soda) which has been washed out during the disintegration of the feldspathic rocks. It is soft and unctuous, and is highly plastic; pulverized spar, on the contrary, is granular or powdery, and is moulded with difficulty. Kaolin, like *silex*, is infusible; under intense and continued heat it shrinks greatly, and becomes extremely hard, but it is always porous and absorbent. *Silex* lessens the contraction of kaolin, spar gives it fusibility; both diminish its absorbent quality, so objectionable in any material that is to be worn in the mouth.

Stone-ware, China-ware, Wedgwood-ware, Parian-porcelain, and Dental-porcelain vary in their properties because of the different proportions in which kaolin and feldspar are combined, also in the kind of flux used. For instance, the Parian statuettes have kaolin and spar in equal proportions, with about half as much of a flux, made of spar, quartz and potash. Dental-porcelain, demanding less heat, less shrinkage and a more translucent appearance, has a very much greater proportion of spar. It has required a very extended series of experiments to combine silica, alumina and potassa in correct proportions, and to know just which of Nature's compounds it is best to use, in order to harmonize the requisites of strength and beauty, so essential to the character of a porcelain tooth.

COLORING MATERIALS.

The foregoing materials give a pure white porcelain of greater or less translucency. It is now required to find substances which will, in the strong heat of the furnace, yield indestructible colors; by skilful combination of which the porcelain may imitate the almost endless varieties of tint in the natural teeth and gum. Of these there are three principal colors and three subordinate ones.

TITANIUM.—The purest varieties of the oxide of titanium are selected: it is found as a mineral in various localities throughout the United States. The crystals are reddish-brown, and have a bright metallic lustre; they give, when ground, a beautiful yellow, or yellowish-brown color. It is used in the coloring of all *body*, and is the basis of color for the class of yellowish *enamels*.

PLATINUM.—This metal, precipitated from its solution in aqua-regia, then washed and dried, is known as Platina sponge. It gives a gray-blue color, and is the basis of color for the class of grayish-blue enamels.

GOLD.—Gold precipitate is used to give life and animation to the tooth, producing often a very remarkable effect. The oxide of gold, known as *Purple of Cassius*, and generally considered to be a mixed oxide of gold and tin, is used to impart the well-known red color of the artificial gum; no less costly substitute has ever been found for this purpose.

Oxide of Manganese gives a purplish color, and is used occasionally for some shades of tooth, but not of gum. *Oxide of Cobalt* gives a bright blue color. If wrapped in best blue paper, and burned in a covered crucible, it is called the Ashes of Cobalt, and is thought to give a more desirable tint to the enamel than the simple oxide. *Oxide of Uranium* is used in its mineral form, and gives a greenish-yellow color; whilst a lemon-yellow color may be given by the oxide of silver: but this is a fugitive color at high temperatures.

These colors singly, and in combination with each other, produce a great variety of colors or shades. Thus, say forty shades of *body-color* are made by using these materials in different quantities and in different combinations; also a like number of *enamel-colors*. Then, starting with the lightest shade of body, forty different grades may be produced, by using a different point-enamel; so of each of the forty shades of body, making, if required, sixteen hundred variations of shade.

The following formulas will suffice to give a correct idea of the proportions in which the preceding materials are combined, to give the **BODY** and **ENAMEL** of porcelain teeth, single or in sections.

| BODY. | ENAMEL. |
|----------------------------|--------------------------------|
| Feldspar.....12 oz. | Feldspar.....3 oz. |
| Quartz..... 2 oz. | Sponge Platina.....1 to 4 grs. |
| Kaolin.....15 dwts. | Flux.....3 dwts. |
| Titanium.....24 to 48 grs. | |

The FLUX here mentioned is made by fusing four ounces of finely ground quartz with Glass of Borax and Sal Tartar, each one ounce: it forms a transparent glass. The following formulas show the preparation of Gum Enamel.

| GUM FRIT. | | GUM ENAMEL. | |
|--------------------|---------|---------------|-------|
| Oxide of Gold..... | 10 grs. | Gum Frit..... | 1 oz. |
| Feldspar..... | 1 oz. | Feldspar..... | 3 oz. |
| Flux..... | 8 dwts. | | |

The titanium, platina, and oxide of gold must, in these recipes, of course, be modified by mixture with other colors to produce the requisite varieties of shade. We shall now briefly describe the processes by which the porcelain teeth and sections, sold to the profession, are manufactured.

PROCESS OF MANUFACTURE.

The silix and feldspar, in their crude state, are first submitted to a red heat, then suddenly thrown into cold water. This is called "Calining," and the effect is to render them more easily broken and pulverized. All impurities having been carefully removed, they are crushed between flint stones; when fine enough, they are put into a mill, formed of burr-millstone, with chasers of the same material. They are ground in water, then floated off, and allowed to settle. The water is then drawn off or evaporated; the silix and spar, dried and sifted, are then ready for use. The kaolin, having been already pulverized in Nature's laboratory, is prepared by washing until perfectly free from impurities, and when dry is ready for use. The Flux and Frit are coarsely ground, but the Coloring materials are reduced to an impalpable powder. All these porcelain materials are combined in proper proportions to form the body and the enamel, then mixed with water and worked into masses resembling putty. When, however, the method of *biscuiting* is adopted, the enamels are mixed in a much thinner state than the body.

The unbaked porcelain masses are now ready for the Moulding-room. The moulds in which single teeth or sections are formed are made of brass, and are in two pieces—one-half of the tooth being represented on either side. The precise shapes desired are carved out with great care; holes are drilled to receive the platina pins in each tooth: when the two halves are fitted accurately together, with guiding pins for exact closure, the mould is ready for use. The brass matrix must be made about one-fifth larger than the size desired, to allow for shrinkage of the porcelain paste. After greasing the moulds, the first operation is, by means of small tweezers, to place the platina pins in the holes made for them (there are many sizes of these pins, differing in length and thickness, to suit the different sizes of the teeth). As no piece of

mechanism can be stronger than its weakest part, there should always be such a relation between the tooth substance and the pins, as to shape, size, and angle of insertion, that one will be as strong as the other, and both sufficient for all legitimate uses. This strength of pin, without loss of strength in the tooth, characterizes a recent and valuable improvement made by Dr. S. S. White, and known as the "foot-shaped pin," illustrated in Fig. 1. The thickest part of this pin is at the angle,

FIG. 1.



or heel; the point, or toe, runs upward into the thick part of the tooth, giving additional security against its being drawn out. The insertion of the pin at an upward angle beds it in the strongest portion of the tooth material; thus any weakening of the thin portion of the tooth is avoided, as when the headed pin is inserted in a straight line; also, the greatest amount of material is found where the greatest strain is brought to bear upon it. The force of mastication is exerted outward and toward the necks of the teeth; thus the shape and direction of this pin are best calculated directly to oppose it. It will also be noticed that its direction and unusual length of insertion permit a close grinding of the tooth, which would cause the usual short and horizontal pin very soon to break away from the porcelain. The double-headed pin, a previous patented invention of Dr. White, was a very great improvement in the shape of tooth-pins; but we think it is destined to be superseded by this new "foot-shaped pin."

The pins being properly adjusted, the enamels for the tooth and the gum are carefully placed in the moulds, by means of a small steel spatula, in the exact position and quantity required; the body is placed in them in lumps corresponding to the size of the teeth; the top of the mould is then put on, and the matrix laid under a press, which compacts each separate mass. They are then dried by a slow heat. When perfectly dry, the top is removed, and the teeth will now drop out. In this state they are extremely tender, owing to the large percentage of feldspar, and require very careful handling.

They are now sent to the trimmers' room, where each tooth is carefully inspected, and all imperfections removed or filled up; the spare edges left by the union of the two sides of the mould are smoothly filed, and the arch of the gum over each tooth made rounding and true with a small pointed instrument. They are then placed on beds of coarse quartz sand, on trays or slides made of fire-clay, and are ready

for the furnace. Formerly, there was another process, called *crucing* or *biscuiting*, which was universally practiced, and is still used in some factories; it is also used in the making of blocks carved to order. It consists in submitting the teeth, after moulding, to a heat sufficient to harden them so that they can be cut or filed like chalk, and what is called an *outside enamel* is then applied with a camel's-hair brush; but it has been found that the composition of the tooth is injuriously affected by this partial burning, subsequent cooling, enamelling, and reburning. This process is unavoidable when the blocks are carved by hand for special cases; but whenever they can be made in a matrix, the tooth is better and stronger when it is enamelled in the mould, and finished in a single firing.

The furnace is built substantially on the principle of the dentist's furnace, differing chiefly in size. The trays holding the teeth are placed in the muffle, and are thus protected against injury from the gases of the fuel. There is no rule which can be given to determine the exact amount of time the teeth must remain in the furnace; the practiced eye of the burner must determine, from the appearance of the teeth, when the firing is completed. If taken out before they are done, the enamel will craze, or crack, in cooling; if a little too much done, the surface will be too glassy, and the body will not be strong. When cool, the teeth are removed from the slides, placed upon wax cards, and are then ready for the dentist.

The vast variety in shape, size, color, etc., of the teeth thus made, gives opportunity for the selection of forms suitable to nearly every case which presents itself to the practitioner. The assortment must of necessity be very large and varied, to meet the wants of the operator; in fact, the manufacturer has shown a better appreciation of the æsthetic requirements of the dental art than the practitioner. Whilst the work of the latter too often exhibits an unmeaning monotony, the former has made provision for even the extreme cases which are sometimes met with; he has also given a beautiful series of those various deviations from a uniform regularity which are so common in natural dentures. In some mouths these seem to be imperatively demanded, to restore the familiar expression; whilst in any mouth, the use of some one or other of them would go far to disarm that suspicion of artificiality, detection of which is mortifying to most patients.

Porcelain is a material in which the beauty of the result well repays the highest exercise of Art. It has been for centuries a favorite material for expressing the Poetry of Form. The famous Etruscan vases of antiquity, the exquisite gems of the *Majolica* of the sixteenth century, the marvellous works of Bernard Palissy, the prince of potters, the beautiful productions of the Sèvres and Dresden manufactories, the well-known charming designs of the Wedgwood-ware, and the still

more recent Parian statuettes, may be named in proof of the fitness of Porcelain to embody the conceptions of Genius. Dental-porcelain is worthy of such associations: not only like them does it delight the eye, and give evidence of high æsthetic cultivation, but it adds to beauty the charm of usefulness. It is customary to attribute the rapid growth of Dental Art, since 1840, to its Associations, Colleges, Journals, and its didactic Literature,—and with much truth. But to Porcelain it owes its very existence, as an æsthetic art, and the larger part of its extent and utility as a prosthetic art. It was altogether impossible for perishable human teeth, or their wretched imitations in ivory, to offer such tempting fac-similes of nature as we meet in porcelain. By thus creating that enormously increased demand for dental service, which has been the chief cause of the rapid development of its resources, it has made the dental profession its debtor to a greater extent than any other single influence. The depot not only renders service by the superior excellence of the surgical instruments and prosthetic materials which it supplies, but it directly benefits the science and art of dentistry, by releasing the practitioner from manufacturing toil, and giving time for the acquirement of increased knowledge and skill. Thus, if the time heretofore given to block-making were devoted to the study of dental æsthetics, patients would have the benefit of an artistic selection from a far larger variety of porcelain dentures than could otherwise be possibly made.

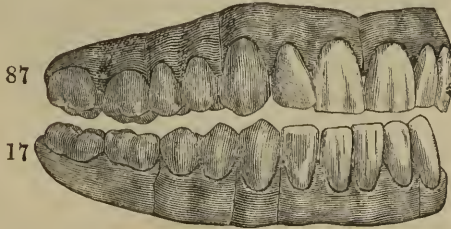
The illustrations of this chapter can but imperfectly convey an idea of the beauty and expression of the originals: they will, however, assist the student in his study of those principles which guide in the selection and arrangement of teeth; they may serve also to awaken practitioners to the extent of the present resources of Ceramic dentistry, and to the importance of æsthetic culture in order properly to make full use of the same.*

The improvements in the Dento-Ceramic Art have sprung from a careful inquiry into the essential characteristics which artistically formed porcelain teeth should possess. Among these are (1) *Naturalness*: under which term are included shape, color, and a vital appearance; the last depending upon the precise amount of translucency, the texture of the surface, and the nice blending of the colors of the body and enamel,—an appearance which should be maintained as well under artificial as under solar light. Many teeth, which will bear inspection

* These illustrations will enable dentists practicing in cities and towns remote from dental depots to order, with some degree of certainty, style, sizes, and shapes of teeth adapted to particular cases on hand. The numbers attached to the cuts are the same as are moulded on the reverse of the blocks.

reasonably well in daylight, have a very unnatural and artificial appearance when exposed in the mouth, to a light under which the wearer may be most anxious to excite admiration. (2) *Shape*: which includes a preservation of the distinctive characteristics of each tooth, securing the instant recognition of its position in the dental arch. There must be some defect or inaccuracy of form if, out of the twenty-eight teeth of a set, in unsorted confusion, an experienced eye cannot tell the place of each; for every tooth has its distinctive contour. Not only should each tooth possess the individuality which belongs to it, but it should also indicate the character of its relation to its companions on either side, and to its antagonist. The eye trained to observe nature should not be offended by the recognition of any inharmony: should not find a second bicuspid or molar in place of a first, or incisors undistinguishable from each other, or an upper tooth in place of its corresponding lower one; nor should it detect in the midst of one style of denture some incisor or canine characteristic of another. Figs. 2 and 3 exhibit very strikingly the marked peculiarities of each one of the

FIG. 2.

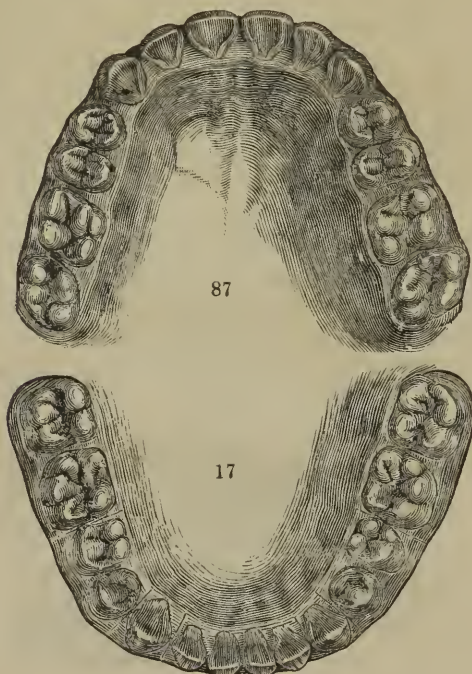


twenty-eight teeth of an artistically designed artificial set: whilst these and subsequent illustrations demonstrate how possible it is for modern dentistry to adapt its work to the great varieties of facial expression. Probably every reader has more than once turned at the sound of a familiar voice, to see a face strangely resembling the looked-for friend. This correspondence between voice and face, often so startling, is only another one of those links between external and internal conformation, which makes the study of æsthetic anatomy essential to the success of the dental mechanician.

The great law of correspondence, which enabled Cuvier to build up the entire skeleton from a single bone, makes us associate the idea of intellect with certain forms of forehead, and of character with certain forms of mouth, nose, and chin: it is the same law which permits us to infer from what remains, the expression of what is lost. Age, sex, temperament, and complexion; also many physical, mental, and even moral peculiarities, are suggested to the acute observer by certain characteristics of the dental organs. The artist who seeks to restore

harmony in the facial expression should be skilled in the observance of these varied manifestations: such skill is demanded alike in the manufacture and in the application of artificial dentures.

FIG. 3.

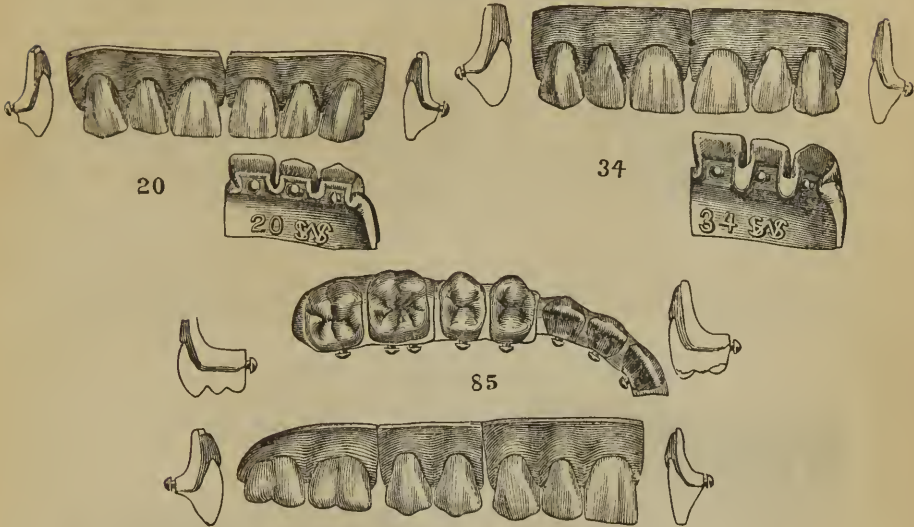


In addition to these æsthetic qualities, porcelain teeth should possess (3) *Strength* adequate to the legitimate use for which they are intended; this strength should come from the quality of their composition, the skilful distribution of bulk to parts most requiring it, and from the due form, position, and proportion of the pins, rather than from any increase in bulk and weight beyond that of the natural organs. They should possess also, by reason of their conformation (4), *Adaptability* to the various irregularities, caused by unequal absorption of the alveolar ridge, so that when judiciously selected they shall require little labor to adapt and antagonize them. Special provision should be made for the results of extreme or very irregular absorption, or for the loss, by disease or otherwise, of parts of the maxillary ridge; so that in such cases the teeth can readily be made to articulate and afford comfort to the wearer, assisting in speech and mastication, and yet not presenting any incongruous appearance.

There are, moreover, special modifications demanded by many other conditions: as, for instance, in cases having a very short articulation,

requiring the pins to be set in a recess, near the crowns of the teeth, thus bringing the greatest resistance where there is the greatest strain in mastication: as is well shown in Fig. 4. In both these blocks the

FIG. 4.



full external size of tooth is given, and its characteristic form and the expression of interdental gum preserved: this could not be done with the usual form of blocks, ground down to suit such cases. The third set has a plain back without shoulder: the pins are set so as to give a longer bite in the front teeth, and in the back teeth so as to allow of grinding off the inner cusps if desirable, thus avoiding the breaking through of the thin shell, which is made when an ordinary block is ground down. In Fig. 5 we have front blocks for mouths, where a shoulder is required

FIG. 5.

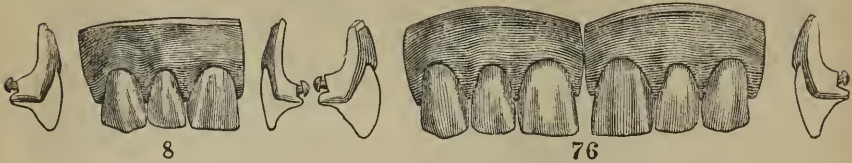


to antagonize with the lower front teeth, when there are no back teeth remaining.

Where early contraction and protrusion of the upper maxillary arch

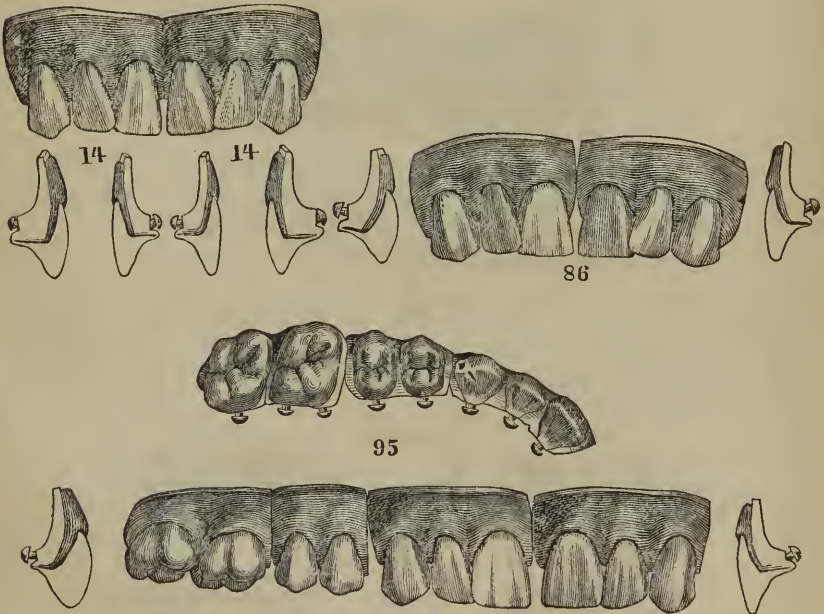
has caused it to have a sharply curved projection, bringing the closure of the lower teeth much behind the upper ridge at the central incisors, or where absorption above has left a ridge prominent at its lower edge, or margin of the gum, it becomes necessary to give a peculiar twisted form to the front blocks. Fig. 6 shows two blocks for

FIG. 6.



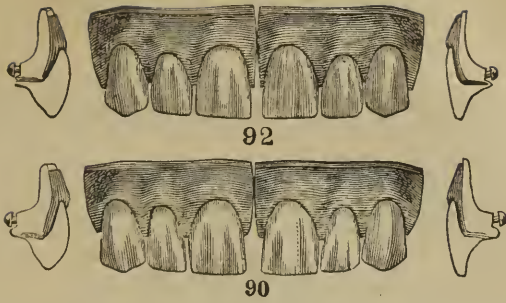
such arches. Fig. 7 represents blocks adapted to pointed arches and crowded dentures. It is impossible to adapt blocks of ordinary form to

FIG. 7.



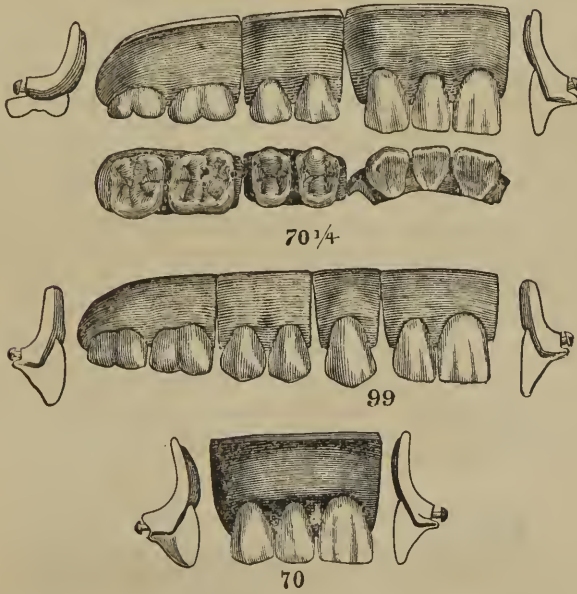
such cases without destroying their true expression at one or other of the joints; in fact, much of both gum and tooth is often sacrificed to get correct articulation. In Fig. 8, the blocks are for cases in which absorption has taken place, especially over the canines, bringing the bite of the lower jaw outside of the upper maxillary ridge.

FIG. 8.



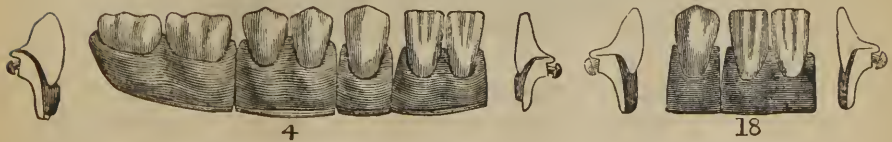
Where a prominence of the gum exists, from want of exterior absorption, teeth such as are shown in Fig. 9 are adapted. The same con-

FIG. 9.



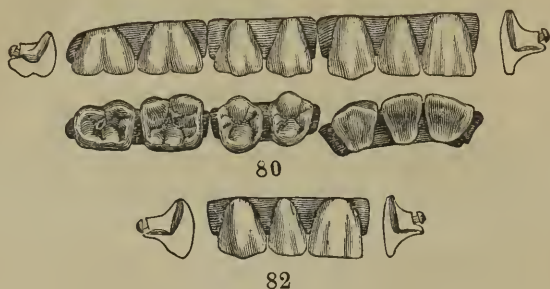
dition of the lower jaw is designed to be met by blocks represented in Fig. 10. Where the previous wearing of a plate requires the teeth to

FIG. 10.



be set directly upon the ridge, with no artificial gum between it and the lip, blocks, illustrated in Fig. 11, are required. In the latter case, if the

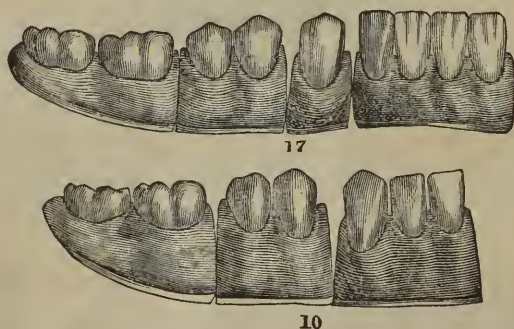
FIG. 11.



color of gum is judiciously chosen and the blocks well adapted, the triangles of artificial gum will be scarcely if at all distinguishable from the natural: we regard this as an extremely useful form of block. Sectional view of the molar, in first cut, Fig. 9, shows the curve necessary to bring its grinding surface directly under the ridge. The views of grinding and cutting surfaces, together with front views, show how each tooth has a distinctive character; as, for instance, in the bicuspsids, so often chosen without regard to the difference in form between the first and second. Again, the curves of the front blocks in Figs. 9 and 11 show two of several variations required in the curvature of the arch: in the upper cut in Fig. 9, the sharp turn at the canines gives a squareness across the incisors; in Fig. 11 this turn is at the central, and is adapted to a pointed arch.

When the molar block of lower sets extends to where the ramus of the jaw begins to rise, a peculiar ploughshare curve of the base is required: such that, whilst the gum of the second bicuspid lies on the outside of the

FIG. 12.



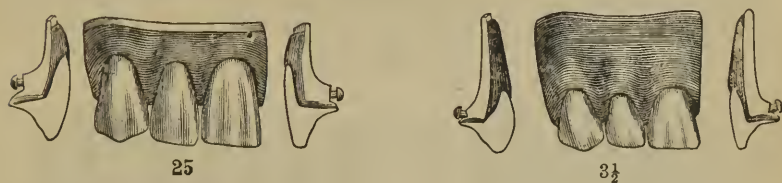
ridge, the gum of the second molar may lie partly upon the ridge, so as to give more perfect antagonism with the upper molars, as shown in

Fig. 12. The molar and bicuspid teeth, from which these were drawn, are also marked by a characteristic curve of the buccal surfaces, giving not only a very natural appearance, but acting as a guard to the cheek, and preventing its being caught between the teeth.

Variations in curvature of the arch are shown also in Fig. 3 and the fourth cut in Fig. 22. Notice also the marked difference in the character of the bicuspids and molars in upper and lower cuts, and the totally different expression of the front teeth in Fig. 2.

Fig. 13 shows how the same intermaxillary space may be filled with

FIG. 13.



teeth of widely different size as well as character. In the first, a very long tooth and short gum; in the second, a very long gum and short tooth. But length of teeth is by no means the only difference here; relative size of central and lateral, direction of the axis of lateral and canine, and outline of cutting edge of the block, are three features which equally mark the distinctness of these two styles: these also are points which demand that both long and short teeth shall differ among themselves as widely as these samples differ from each other. The lateral view of these teeth shows another marked difference in form.

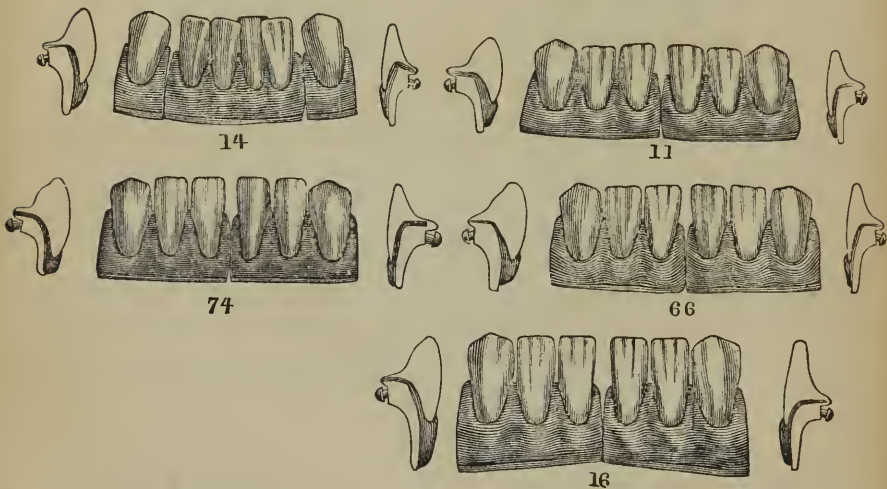
FIG. 14.



Fig. 14 gives the characteristic equality of lower incisors, or slightly greater size of the lateral; it also gives some of the diversities in length,

width, shape of cutting edge, and form at arch of the gum. Although there is much less difference in the shape of the six lower front teeth than of the six upper, it is a great mistake to suppose that a given lower block will answer for any lower case, if only long enough. Side views show also a difference in the slant of the teeth, inward or outward, which has an important effect in modifying the expression of the lower arch. There are also differences in curvature of the lower arch as well as of the upper. Fig. 3 shows the usual upper and lower curves, and Figs. 9, 11, and 22 show variations of upper curvature requiring some modifications of the lower, dependent on the character of the articulation. In Fig. 15 are five other forms of lower front blocks, the value of which will be

FIG. 15.

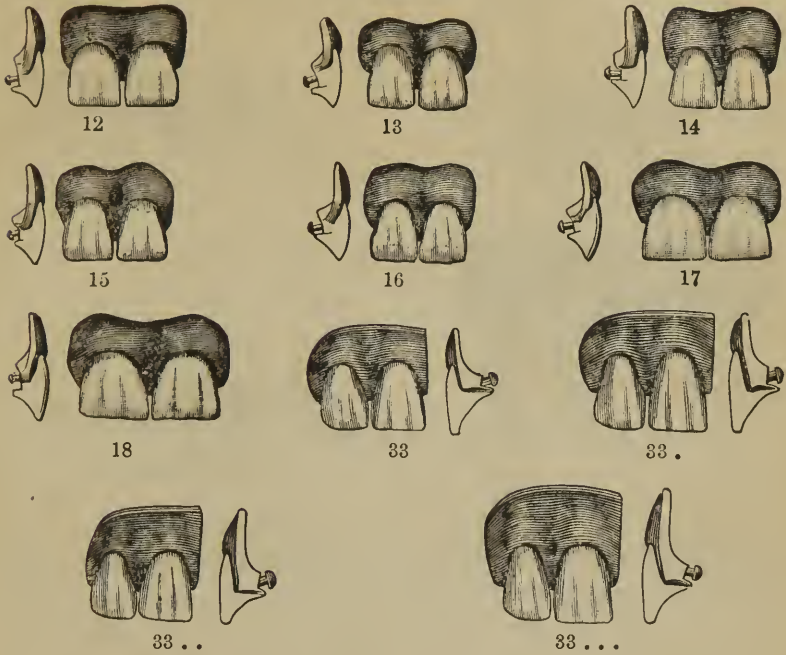


at once recognized. The three right hand sets differ from those of Fig. 14 mainly in the length and width of teeth. The left lower set is well suited to patients whose natural teeth, for many years before their loss, were marked by exposure of the neck: this appearance may also be increased (sometimes it may be made) by judicious use of the corundum-wheel, but the block here given is invaluable for such cases. The left upper block is an admirable imitation of a very usual arrangement of incisors, resulting from crowded dentition: the drawing gives a very imperfect idea of the great beauty of the original porcelain block. When the facial expression indicates its use, it will have great effect in disarming suspicion of artificiality,—a very desirable quality in artificial dentures.

In Fig. 16 we have very convenient modifications to suit front spaces of two or four teeth; the set of four being in two blocks. The

peculiarity of these blocks is the lateral finish of the gum ; instead of a square joint, for fitting to an adjoining block, they have a rounded

FIG. 16.



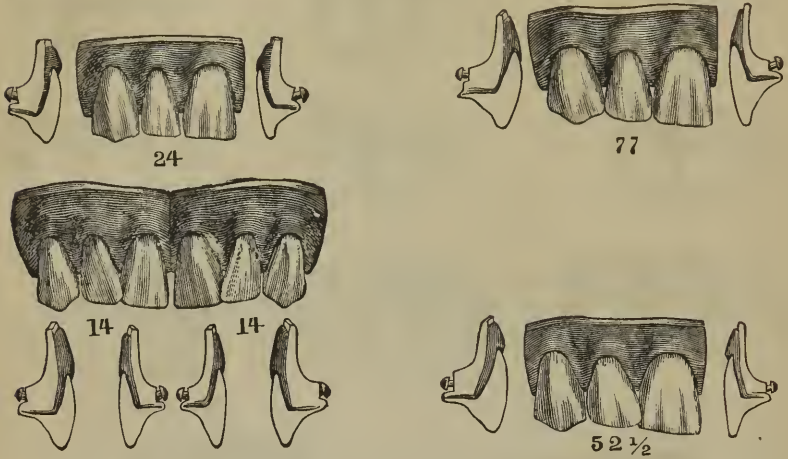
edge of gum color that can be adapted to the curves of the absorbed natural gum. There should also be blocks of two, a lateral and central, with gum shaped like the double central, as such spaces are of frequent occurrence. Besides the forms of teeth here given, there are many other varieties, in size and shape of this very useful kind of block.

Figs. 17, 18, and 19 represent a few of the great variety of forms of upper incisors and canines, designed to meet the demands of an æsthetic discrimination. In Fig. 17 we have, first, a long, delicate lateral, with sloping but not rounded edge, showing a decided space between it and the cuspid and central: then we find it wider, with corners and edge rounded and filling the space. Lastly, for want of space, the laterals, although long and narrow, overlap the centrals: this style is generally accompanied with a pointed arch. The fourth block, although with an overlapping incisor, has an entirely different character: it is often found in a rather flattened arch, and does not indicate a crowded denture. In these blocks, the inclination and shape of the canine, as well as the shape of the incisor, help to give to each

block a distinctness of character which will not permit the use of one in a case demanding either of the others.

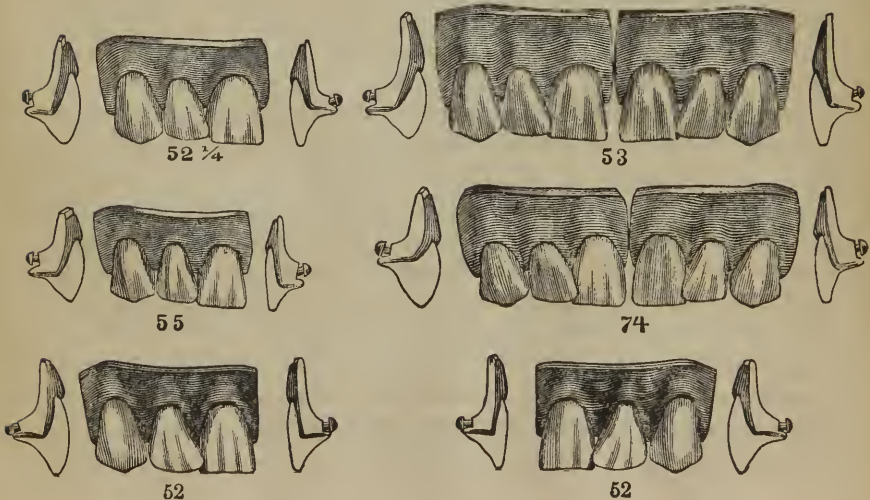
The *celare artem* effect of overlapping or twisted laterals, like that of irregular lower incisors, is such as to tempt one to use them whenever admissible.

FIG. 17.



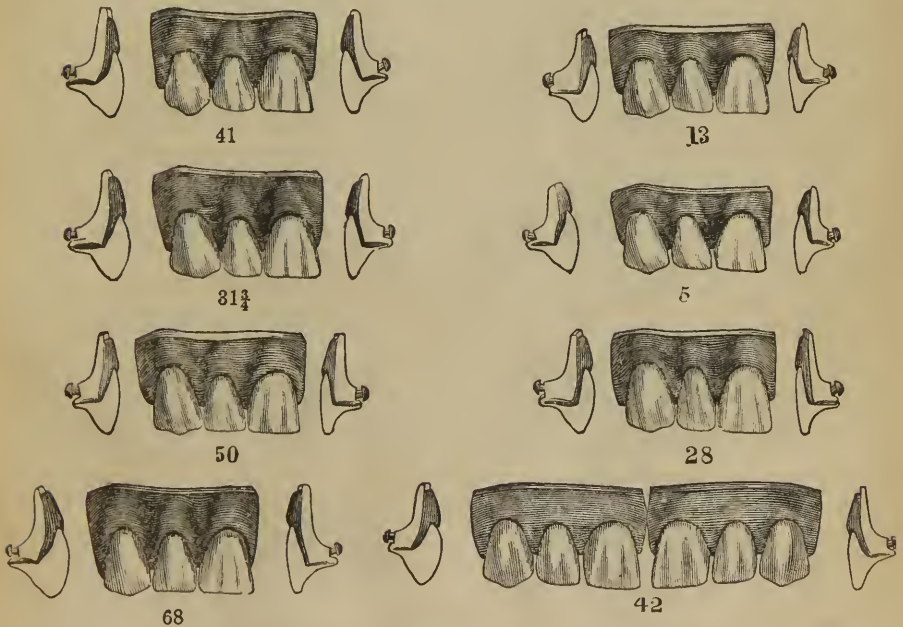
In Fig. 18 we have some additional varieties of this kind of block. In all these cases we find differences in the size and character of the lateral, in the extent of its lapping, and in the degree of twist given to it. A careful study of natural teeth will teach the dentist what character of face is best suited to each of these different forms, and thus he will much increase the extent to which he may properly use this kind of irregularity.

FIG. 18.



In Fig. 19 the blocks vary little in size, yet they each have a distinctive character. In the first, we have lateral rounded on both corners, and its axis vertical; canine, with pointed cusp and edges quite rounded. In the second, we have lateral inclined, with median corner pointed, lateral corner quite round; canine with blunt cusp, also axis inclined. In the third, surface of the canine is decidedly furrowed, which, with the indented edge, gives it a marked character: the lateral and central, unlike the previous blocks, have square-cut edges, with corners but slightly rounded. In the fourth, the lateral is more nearly equal to the central, and none of the teeth have any marked peculiarities: this style of block, in its different sizes, suits well in many cases, and is perhaps one of the best for general use by those practitioners who pay no regard, in their selection of teeth, to the indications given by the physical characteristics of the face and head. The eighth block is one of that class often met with in old age, where, by the action of the lower teeth or other causes, the arch has spread, widening the interdental spaces. The interdental gum is also much shorter than in youth, as is finely shown in the original from which this cut is taken.

FIG. 19.



Figs. 20 and 21 illustrate additional forms of upper incisors and canines, giving a wide range of selection where teeth of this character are indicated.

FIG. 20.



In the selection of porcelain blocks, not only must the color, size, and form of the teeth be carefully considered, but reference must also be had to the curvature of the arch. For although moderate varia-

tions in curvature can be fitted by the same set of blocks, the true expression of a porcelain denture is often lost by the attempt to adapt it to a curve for which it was not designed. In Figs. 3, 9, 11, and 22

FIG. 21.



we have various curves of the alveolar arch, with corresponding variations in shape of the blocks. Sometimes the canines are made separate with a view to increase the range of application of a given set: but a

joint on either side is very apt to injure the effect of this important tooth. In the lower jaw it is of less consequence because the gum is less often exposed, and it is frequently desirable to make the four incisors in one block. But in the upper jaw, it is much better to have a median joint, and another behind the canines.

In Fig. 22 the reader will notice that the centrals of the first set overlap the laterals, an arrangement of frequent occurrence in promi-

FIG. 22.





nent and sharply-curved arches. In the second set the blocks are so shaped that the left central overlaps its fellow. Thus we have three varieties of overlapping upper teeth; laterals over central, laterals over laterals, central over central; each of which may be used with great effect, if applied with discrimination. In the fourth set, of Fig. 22, and in a few of the preceding cuts, the gum over the cuspids is very strongly marked. This is a very characteristic feature of some mouths, and when correctly used gives a fine effect; but it would sadly belie the expression in a timid and gentle lady's face. Yet such incongruity is only one of hundreds, constantly occurring, where every sense of æsthetic beauty and harmony is violated:—teeth of a Russian in the mouth of a Frenchman; those of a New Englander given to a South Carolinian, or those of a Canadian to a Cuban—the lips of age disclosing the teeth of youth, and no distinction made between a male and a female denture. These æsthetic blunders are not confined to the inexperienced tyro, but are perpetrated by many who presume to call themselves skilful mechanics. When we consider the extensive assortment of porcelain teeth which ceramic art has placed at the disposal of the practitioner, such malpractice is without excuse.

These are only a few out of the great number of varieties, in size, form, and arrangement, of porcelain teeth; they give to the dentist a

much wider range of selection than some have the ability or inclination to avail themselves of. When to variety of shape we add shades of color, the number of sets that admit of being made, distinguishable at a glance from each other, seems almost infinite. A visit to a first-class porcelain-tooth manufacturer's rooms will convince any one that incongruity or want of expression in a set of teeth is the fault of him who selects and applies rather than of him who designs and makes dental porcelain.

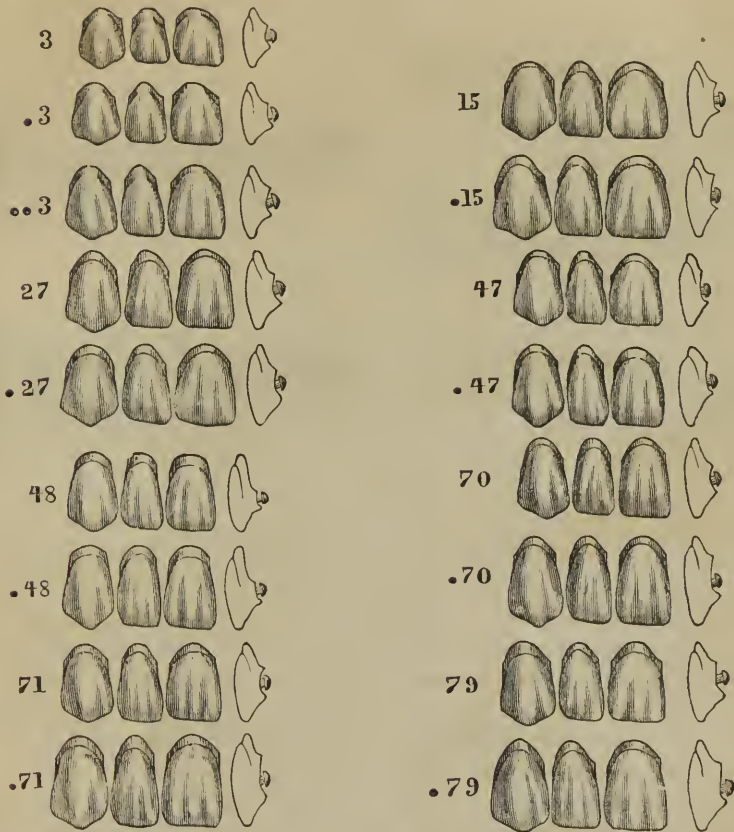
It will be perceived that the foregoing illustrations* of the æsthetic principles of the dento-ceramic art are taken from one class of teeth, those for vulcanite or metallo-plastic work. We have done so because the art has here had its fullest recent development, in consequence of the great demand for this form of block. But dental æsthetics is quite independent of the material of the plate, so long as that which is visible in the mouth is porcelain; and dentures which show any substitute for the gum other than this, however useful they may be, cannot rank as specimens of highest art, until some material for the plate shall be discovered, possessing higher claims to beauty than any yet known.

The foregoing rules will apply to the form and size of plain teeth when these are set directly upon the natural gum; but, except in case of true pivot or plate-pivot teeth, it is impossible to reproduce the precise natural arching of the gum above the tooth without some gum-colored porcelain. We must often be content, in such cases, with the nearest possible approach to nature. But when the plate is seen on the outside of the arch, the artist's reputation is dependent upon the concealment of the greater part of his work: even here, however, the cutting edge and two-thirds of the tooth permit the display of great varieties of expression. Of plain teeth without gum there are four kinds. 1. Pivot teeth: shaped somewhat like the crowns of the upper incisors and canines, with a hole in the base, for insertion of a wooden pivot. 2. Plate teeth: the oldest known form of porcelain teeth having pins for attachment of a back, by which to secure it to the plate. 3. Continuous-gum teeth: resembling natural teeth in having a root which is more or less serrated, for better retention in the investing porcelain base: they are sometimes made without platina pins; but they are better with pins, so that they may be securely fastened to the pla-

* We are indebted to the kindness of Dr. Samuel S. White, of Philadelphia, for the admirable illustrations by the aid of which we have been enabled to express our views upon the important subject of dental Æsthetics. No illustrations, however, can convey a true idea of the high artistic excellence of those forms the production of which has placed Dr. White among the greatest benefactors of Dental Art. We take this occasion to acknowledge, also, the liberality and courtesy with which our inquiries, for information on the manufacture of dental-porcelain, were responded to by this gentleman.

tina plate. 4. Plain vulcanite (Fig. 23): having a small neck, by which they are held in the vulcanite or other material in which they

FIG. 23.

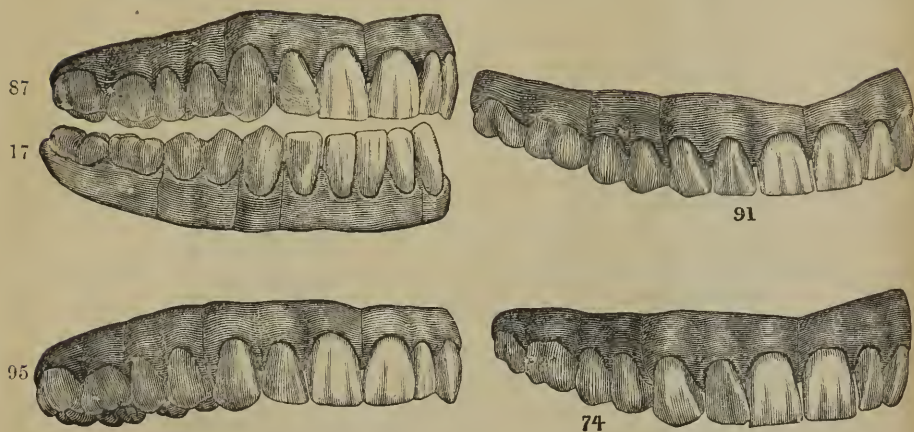


are set. These teeth may be set directly on the gum by grinding off the neck; they may also be used adjacent to natural teeth with exposed neck, by slight alteration of this neck, so as to give to the artificial tooth the same appearance as the natural one.

There are also other forms of gum teeth besides those above represented. Formerly, single gum teeth were extensively used on gold plate, and may still be occasionally required when the supremacy of that old-fashioned material becomes once more recognized in the laboratory. The great facility of adapting blocks or sections in vulcanite work, or in vulcanite attachment to swaged plates, has led to the almost entire exclusion of this form of tooth, except for repairing. A serious objection to single gum teeth is the number of joints: these greatly mar the artistic effect which it is the design of the artificial gum to pro-

duce, especially when not kept perfectly clean, or when the material of plastic plates is allowed to enter the joints. Fig. 24 is designed to

FIG. 24.



show the importance of correct and accurate grinding in order to display the true character of a set of teeth. When properly done, the joint does not interrupt the continuous surface of the gum more than the lines in the two lower sets of Fig. 24; nor should it in any case be more visible than the heavier lines of the first set. Neither should the set be so inaptly chosen as to require such grinding of joints and base as to injure its original expression. Fig. 24 should also be carefully studied by the student, on account of the varieties of form and relation of teeth presented: each of the four upper sets here displayed having a very distinctly marked character.

We cannot more appropriately close this chapter on dental porcelain than by quoting some remarks of the great English ceramic manufacturer, Josiah Wedgwood, applicable to the art which he did so much to elevate. They have a significance beyond ceramic art; and convey, in this lesson of the past, a warning to those who may, perhaps unconsciously, be dishonoring the profession of their choice.

"All works of taste must bear a price in proportion to the skill, taste, time, expense, and risk attending their invention and manufacture. Those things called dear are, when justly estimated, the cheapest: they are attended with much less profit to the artist than those which everybody calls cheap. Beautiful forms and compositions are not made by chance, nor can they ever, in any material, be made at small expense. A competition for cheapness, and not for excellence of workmanship, is the most frequent and certain cause of the rapid decay and entire destruction of arts and manufactures."

Art Works of Taste

must bear a price in proportion to the skill, taste, time, expense and risk attending their invention and manufacture. Those things called dear are when justly estimated, the cheapest; they are attended with much less profit to the artist than those which everybody calls cheap. Beautiful forms and compositions are not made by chance, nor can they ever, in any material, be made at small expense. Competition for cheapness, and not for excellence of workmanship, is the most frequent and certain cause of the rapid decay and entire destruction of arts and manufactures."

This quotation from Josiah Wedgwood so forcibly and admirably contrasts excellence and cheapness, and is so applicable to every variety of cheap Dentistry that we have inserted it in this form in order that it may be readily removed by any who desire to do so, and framed for the office.

IMPRESSION TRAYS.

NEW FORMS.

DESIGNED BY MR. E. T. STARR.

(PATENT APPLIED FOR.)

THESE Trays are made of britannia metal, of the best quality, and of uniform thickness. They are light enough to allow of alteration by pliers or mallet, or, for many cases, with the fingers, so as to adapt them to any peculiar formation of the maxillary. They are superior in form and finish to any heretofore offered to the profession, while the price has not been advanced.

UPPER IMPRESSION TRAYS.

FIG. 1.

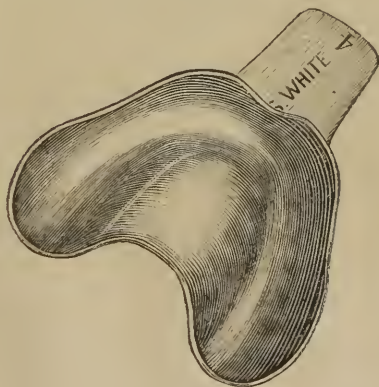
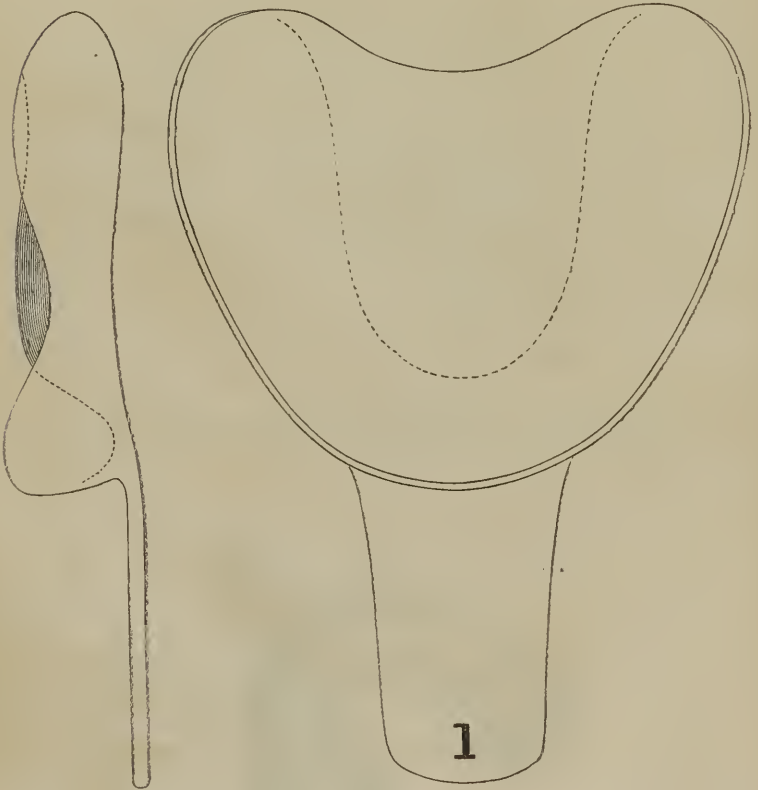
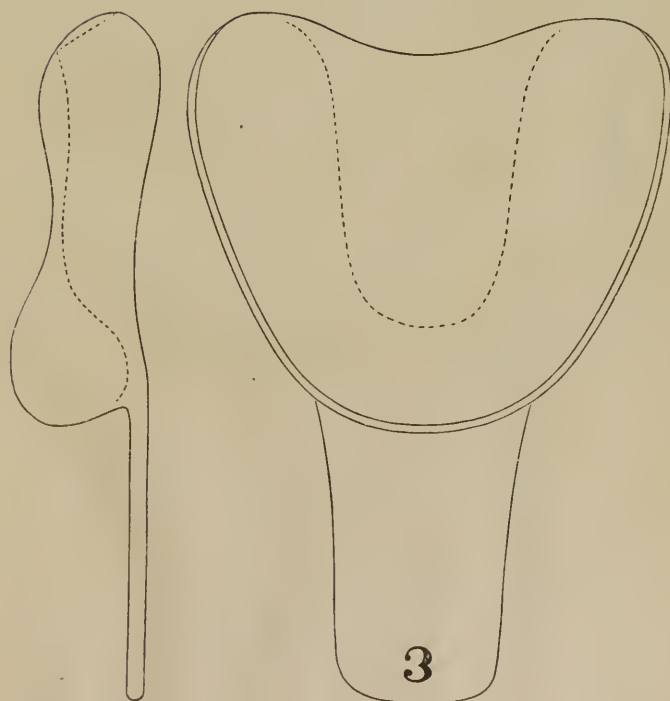
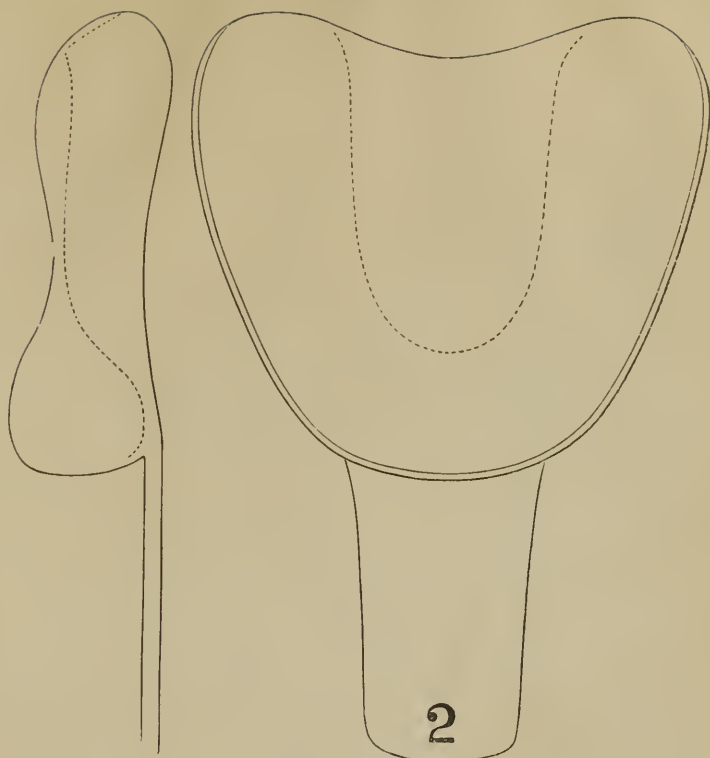


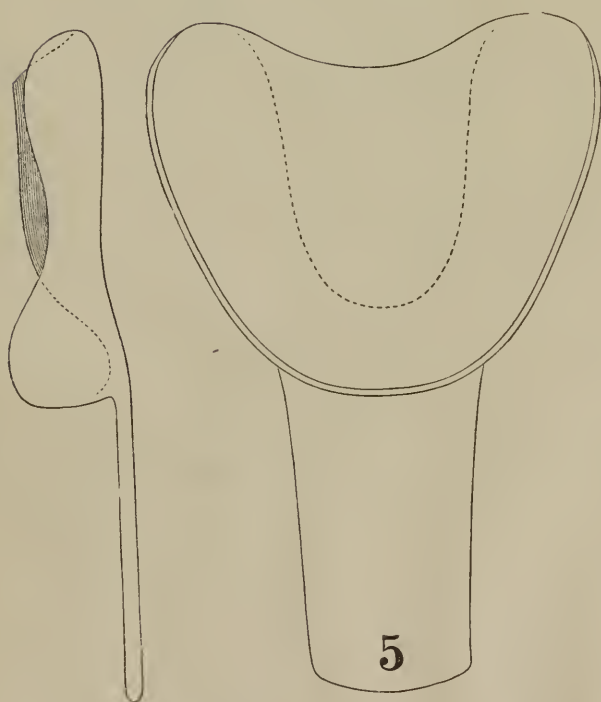
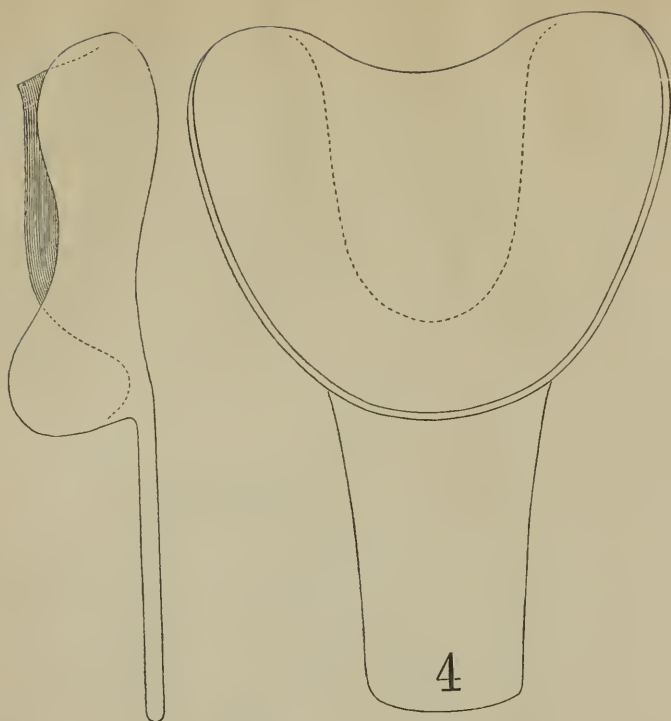
Fig. 1 illustrates the shape of a set of eight, Nos. 1 to 8, for whole upper dentures. Especial attention is invited to the modifications in form—to the dip at the sides, to accommodate the prominences of the malar processes; and in front to avoid the labial frænum; and to the length ($1\frac{1}{2}$ inches) and position of the handle, which, being below the line of the base, gives more room for the lip.

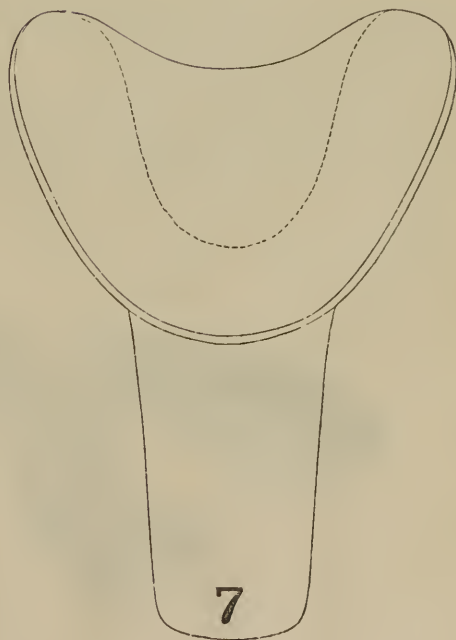
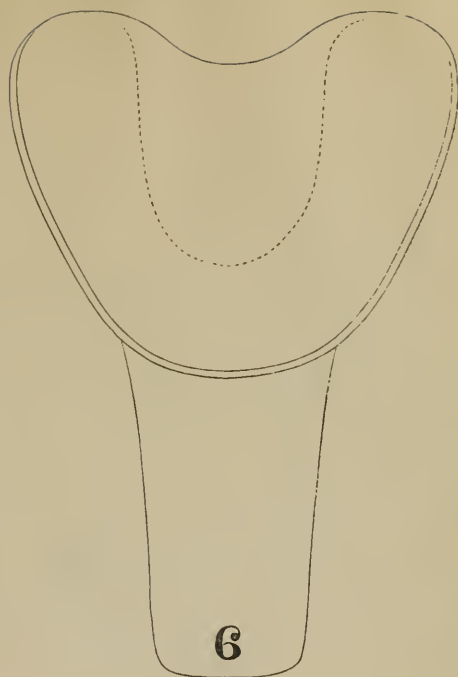
The exact size of each Tray of the set is outlined, with its number attached, by which it may be ordered. The side views show, by the dotted line, the height of the palate portion of the Tray.

Price, each 50 cents.









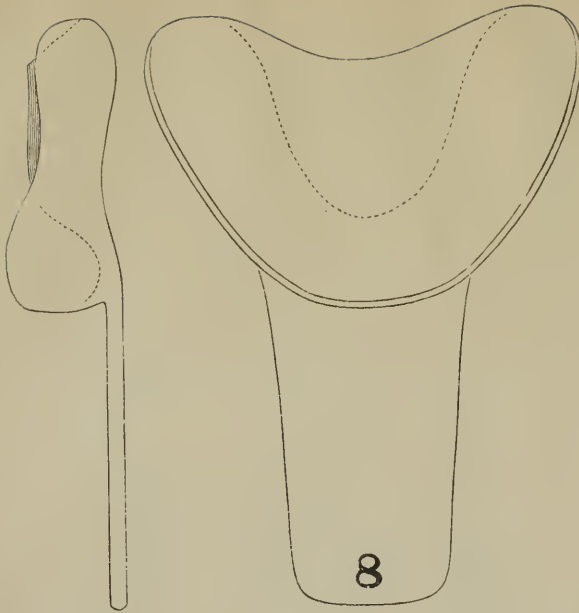
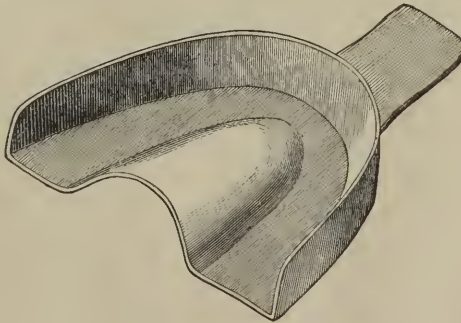


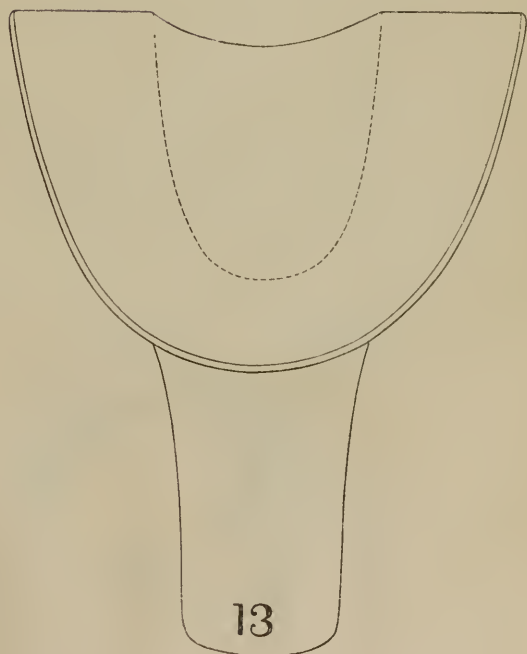
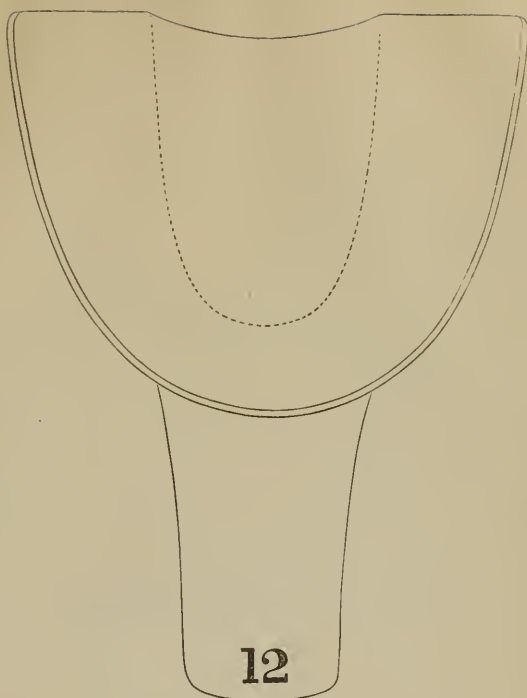
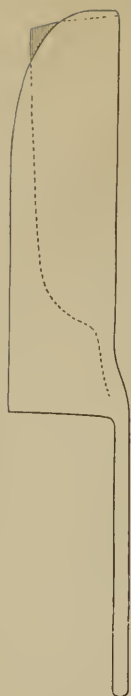
Fig. 2 illustrates the shape of a set of five, Nos. 12 to 16, for partial upper dentures, with flat bottom and square sides; the handle, $1\frac{1}{2}$ inches in length, set below the line of the base.

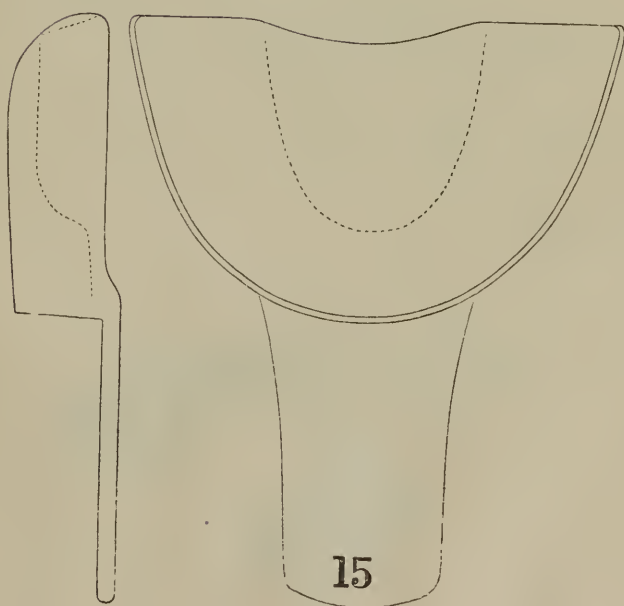
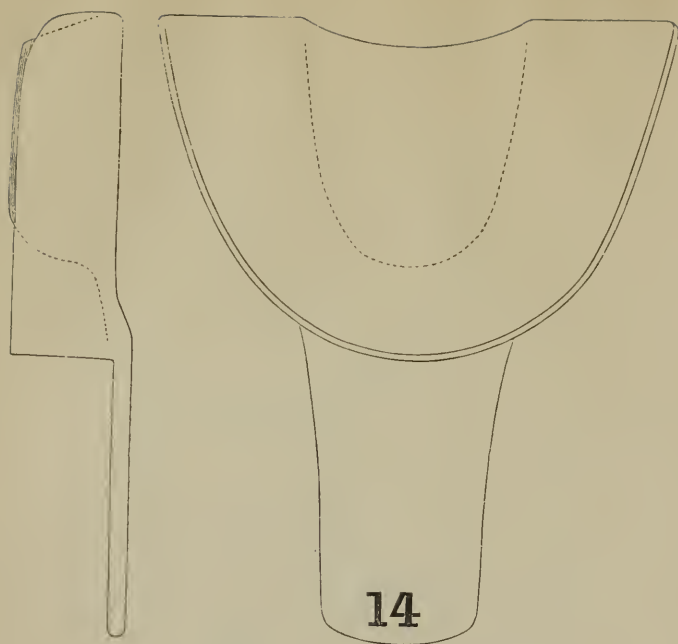
The exact size of each Tray of the set is outlined, with its number attached, by which it may be ordered. The side views show, by the dotted line, the height of the palate portion of the Tray.

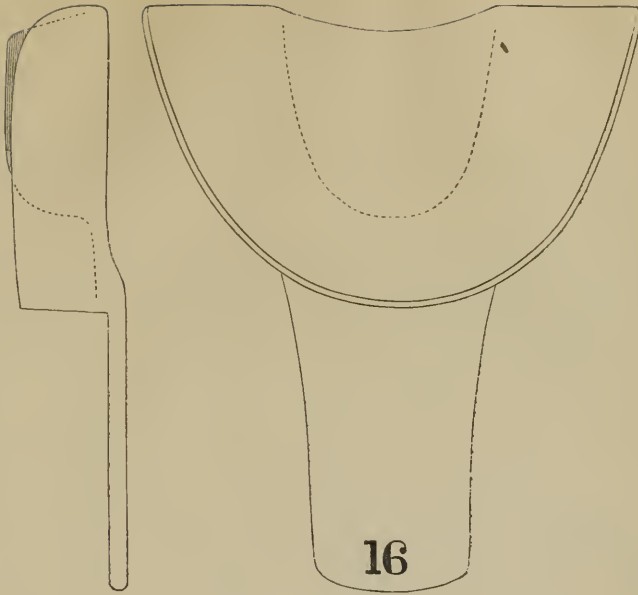
Price, each 50 cents.

FIG. 2.





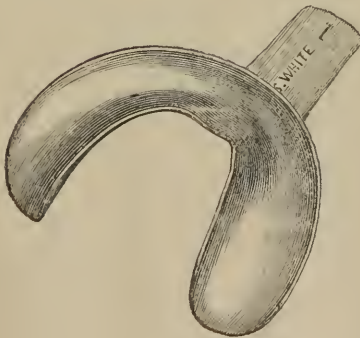




LOWER IMPRESSION TRAYS.

Fig. 3 illustrates the shape of a set of seven, Nos. 1 to 7, for full lower dentures.

FIG. 3.

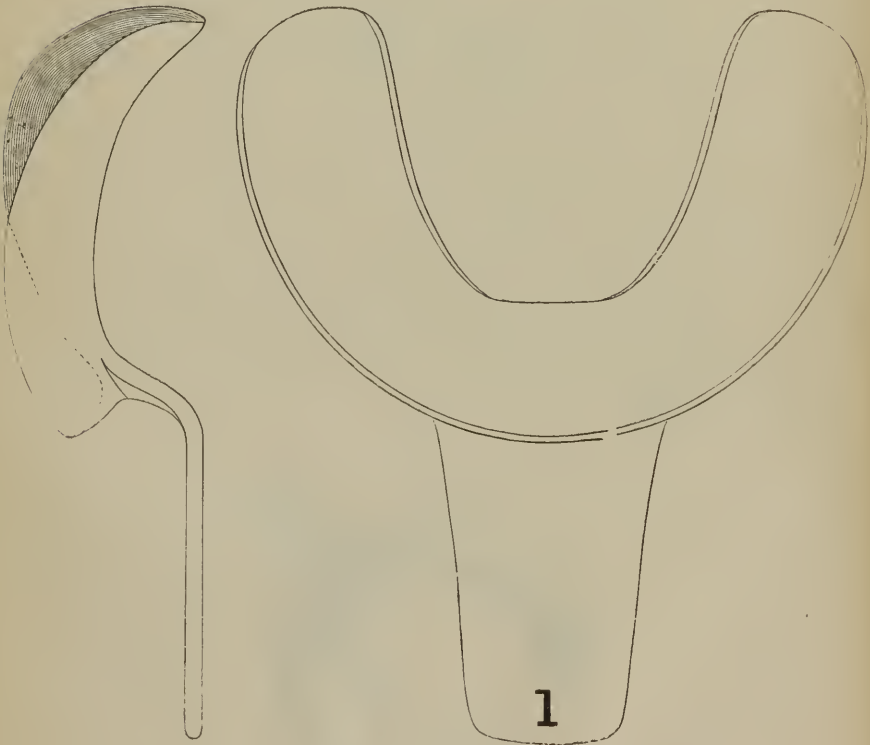


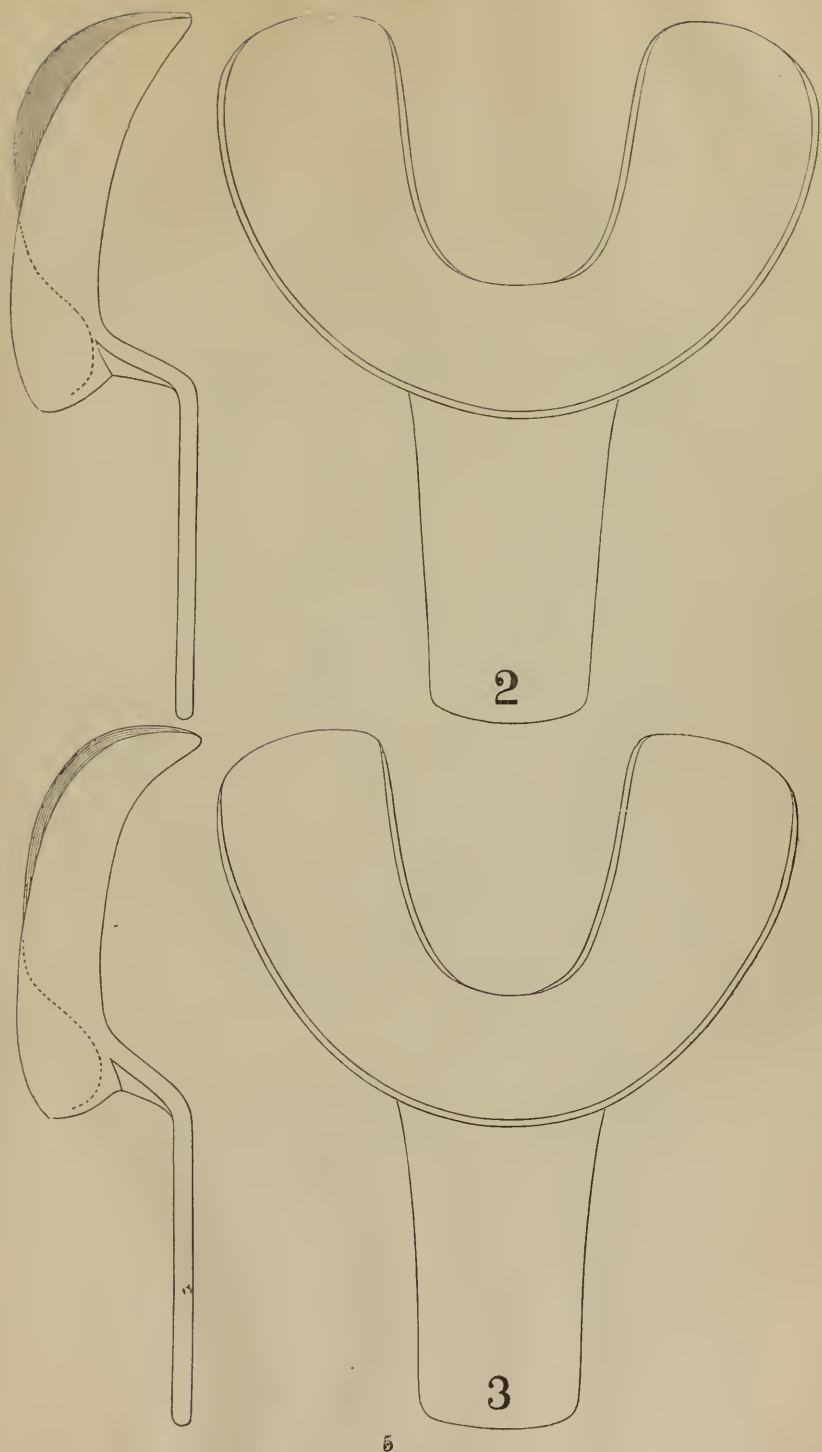
These are formed on models taken from impressions of the mouth. The handle is $1\frac{3}{4}$ inches in length, and curved so as to raise it three-eighths of an inch above the base, giving room for the lip, and allowing the Tray to set well down on the maxillary. These have a special shape on the inner line designed to avoid the lingual frænum.

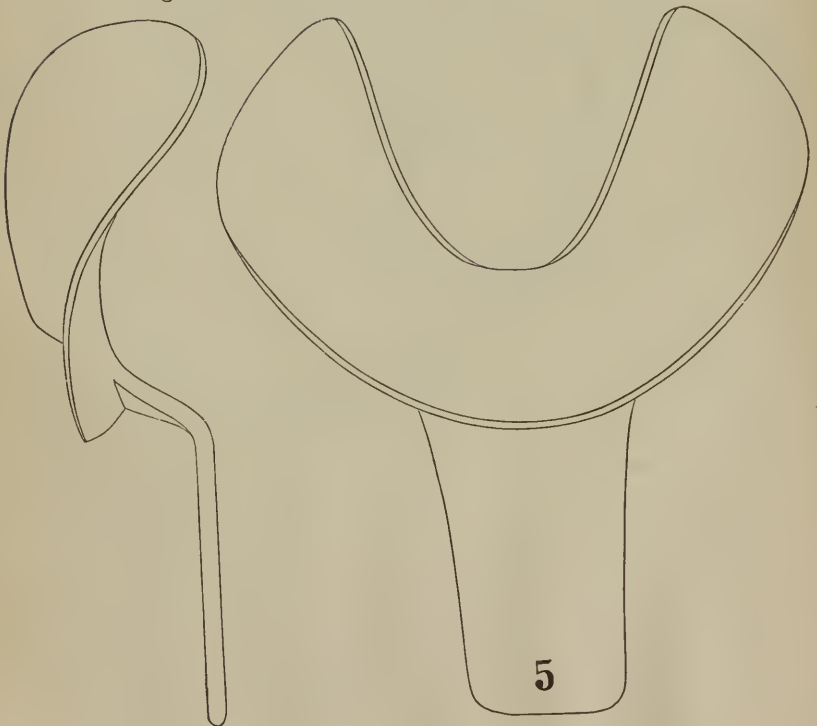
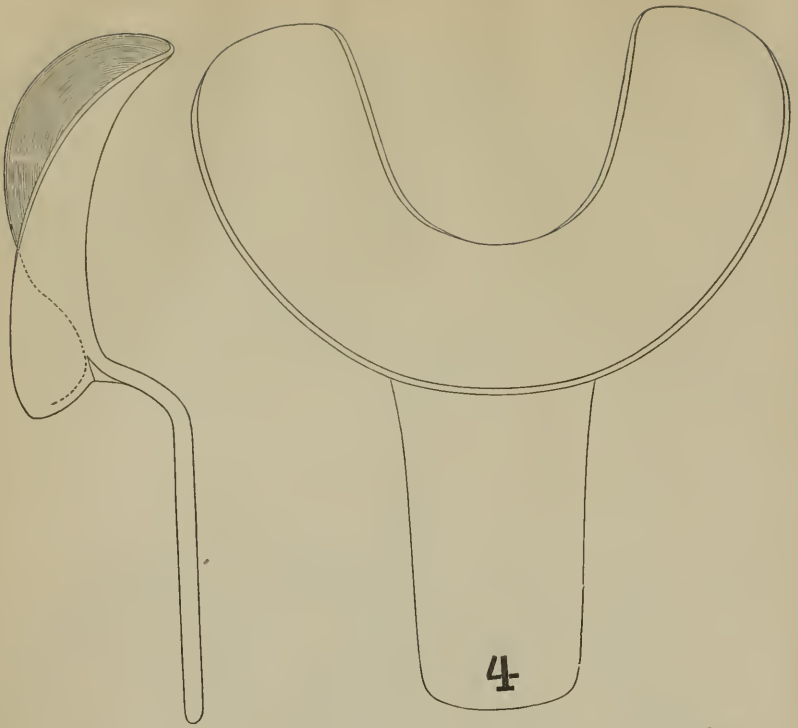
Nos. 5 and 6 are specially designed for cases where great absorption has taken place, and the muscles of the mouth are on a level with the maxillary ridge.

The exact size of each Tray of the set is outlined, with its number attached, by which it may be ordered. The side views show, by the dotted line, the relative dip of the outer and inner edges of the Tray.

Price, each 50 cents.







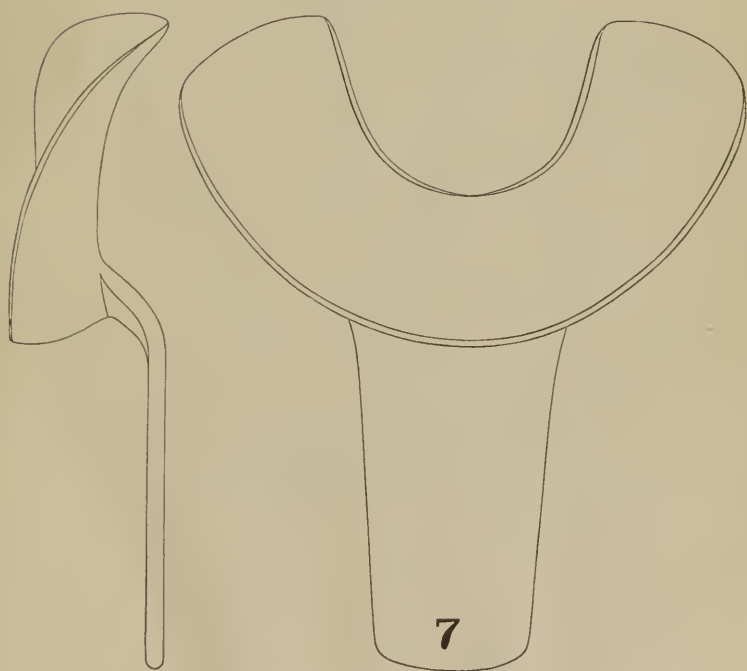
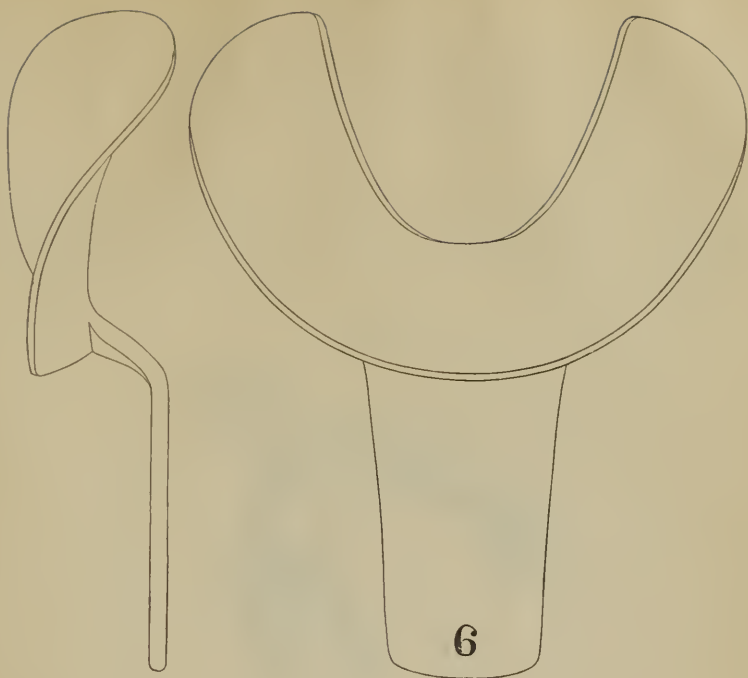
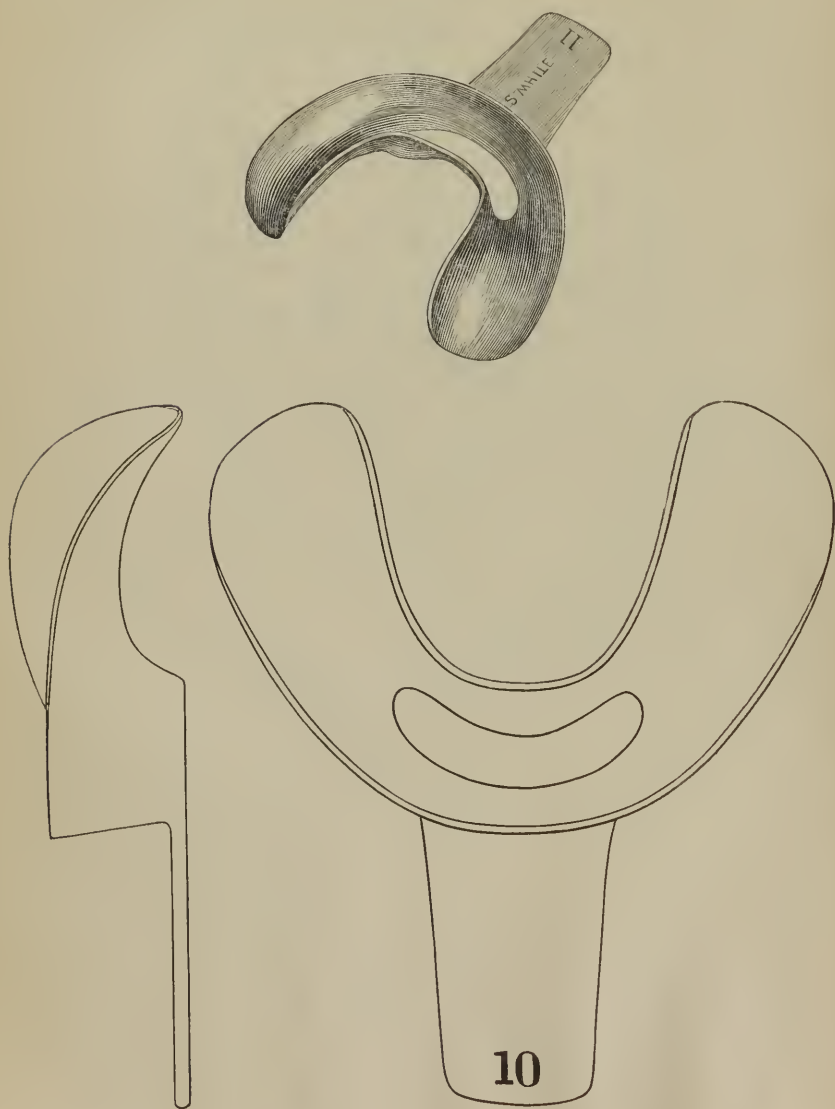


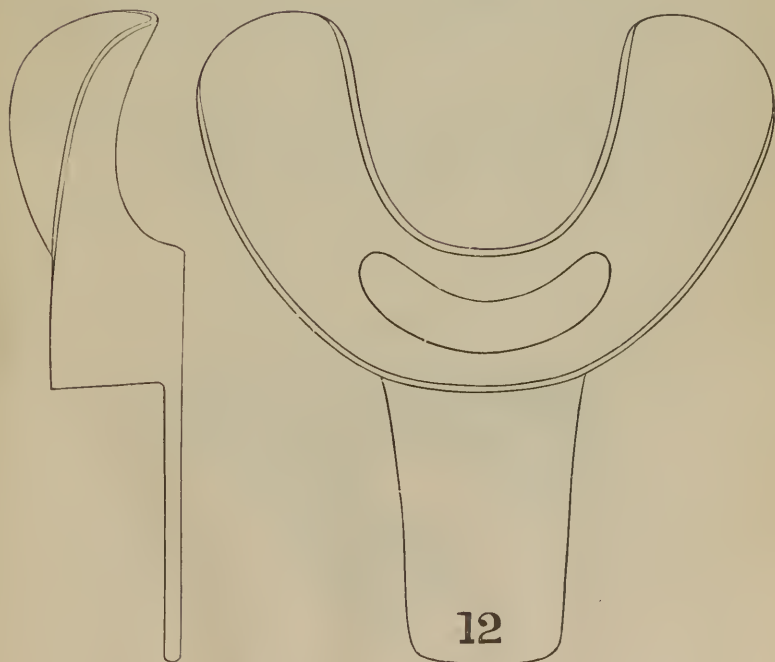
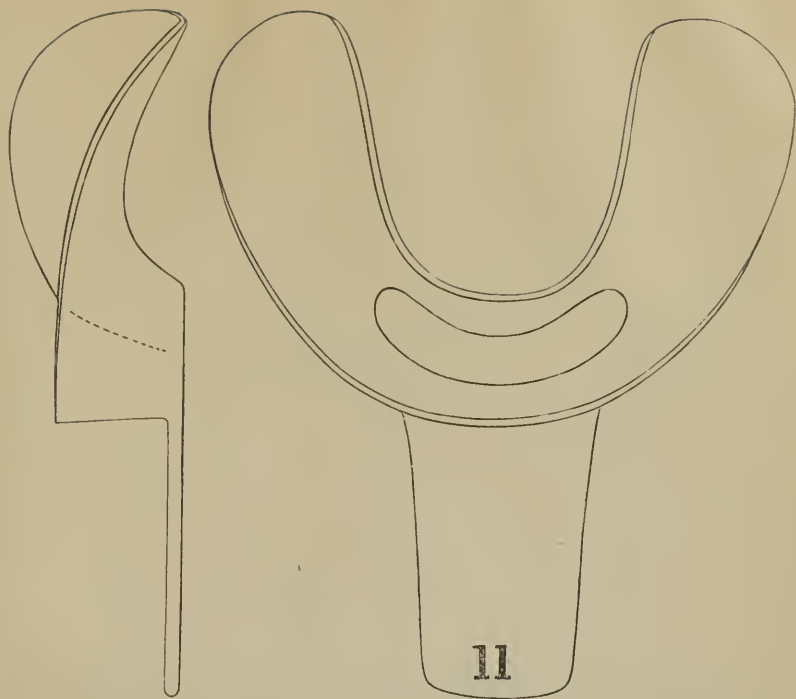
Fig. 4 illustrates the shape of a set of four, Nos. 10 to 13, for partial lower dentures, having a *cavity* open to allow the front teeth to pass through, and the Tray to pass down to the maxillary ridge. The handle is $1\frac{1}{2}$ inches in length, and attached to the base of the Tray at its highest point.

The exact size of each Tray of the set is outlined, with its number attached, by which it may be ordered. The side views show, by the dotted lines, the relative dip of the outer and inner edges of the Tray.

Price, each 50 cents.

FIG. 4.





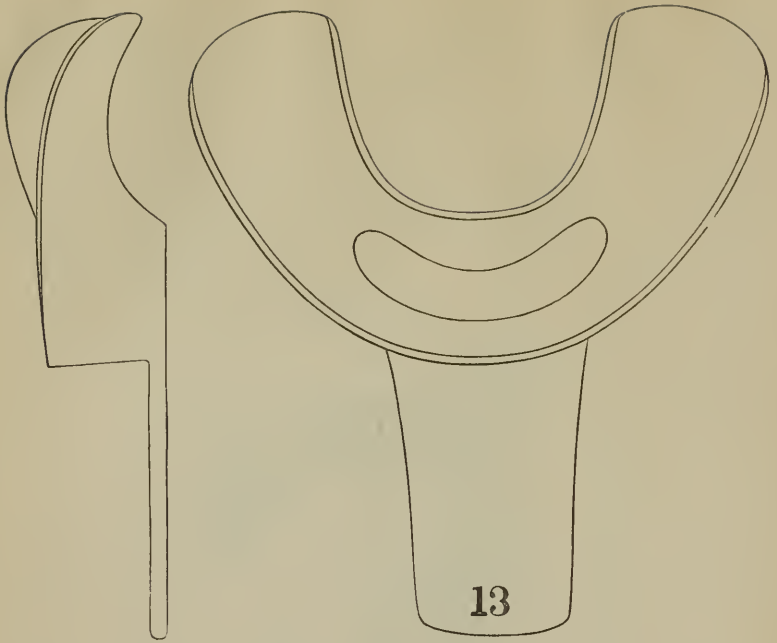
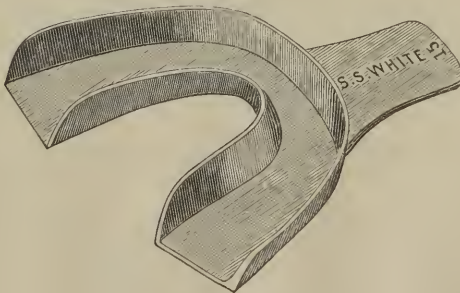


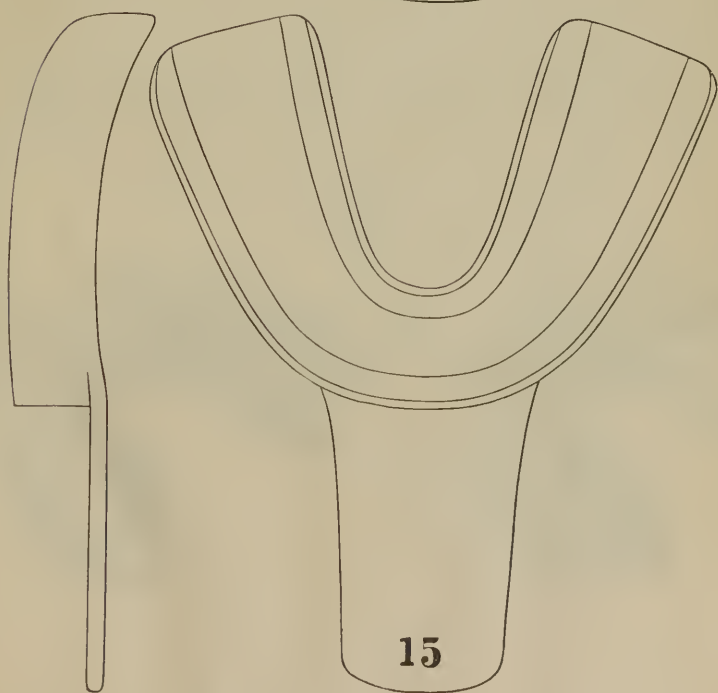
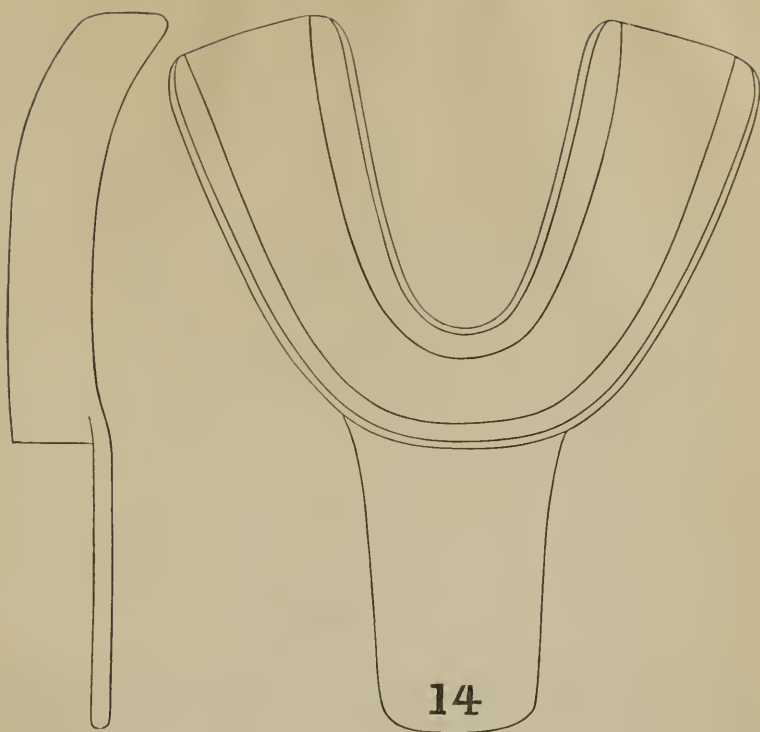
Fig. 5 illustrates the shape of a set of three, Nos. 14 to 16, with flat bottoms and square sides, designed especially for taking impressions of lower teeth, by which to obtain the antagonizing model for upper dentures.

The exact size of each Tray of the set is outlined, with the number attached, by which it may be ordered. The side views show the position of the handle, and the height of the body of the Tray.

Price, each 50 cents.

FIG. 5.





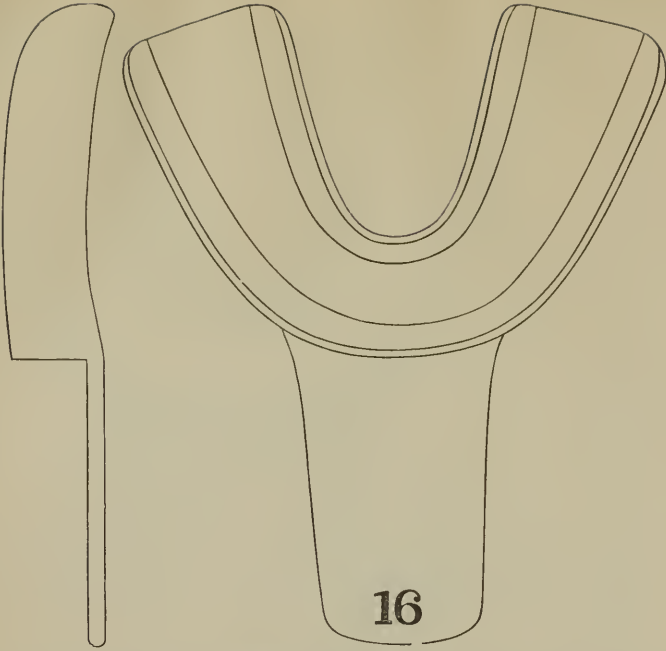
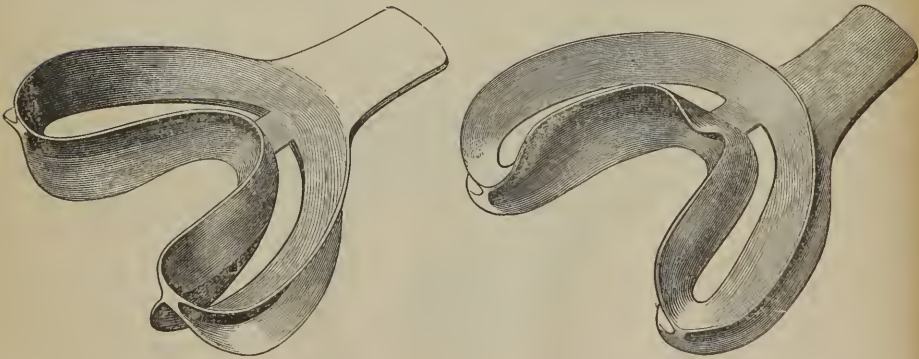


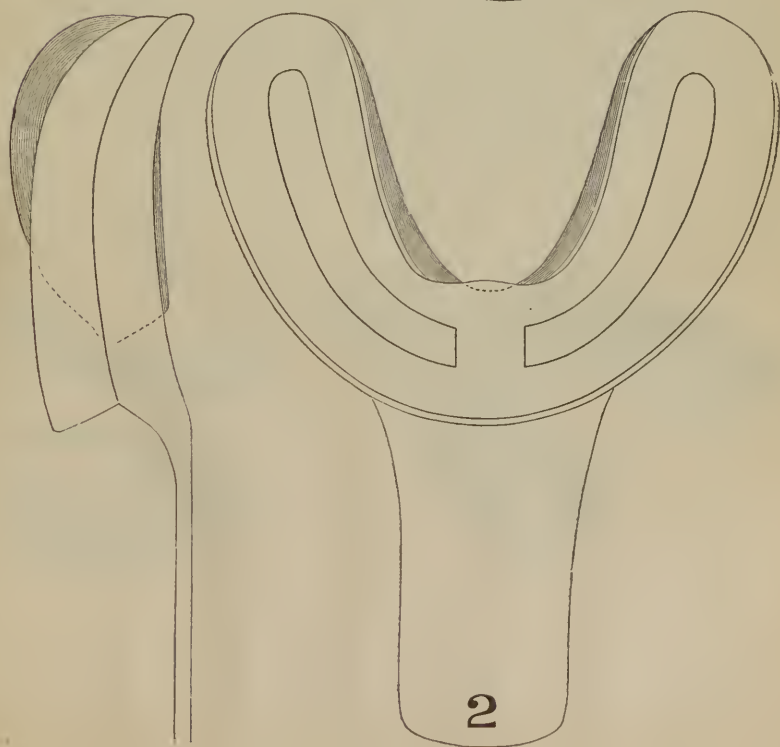
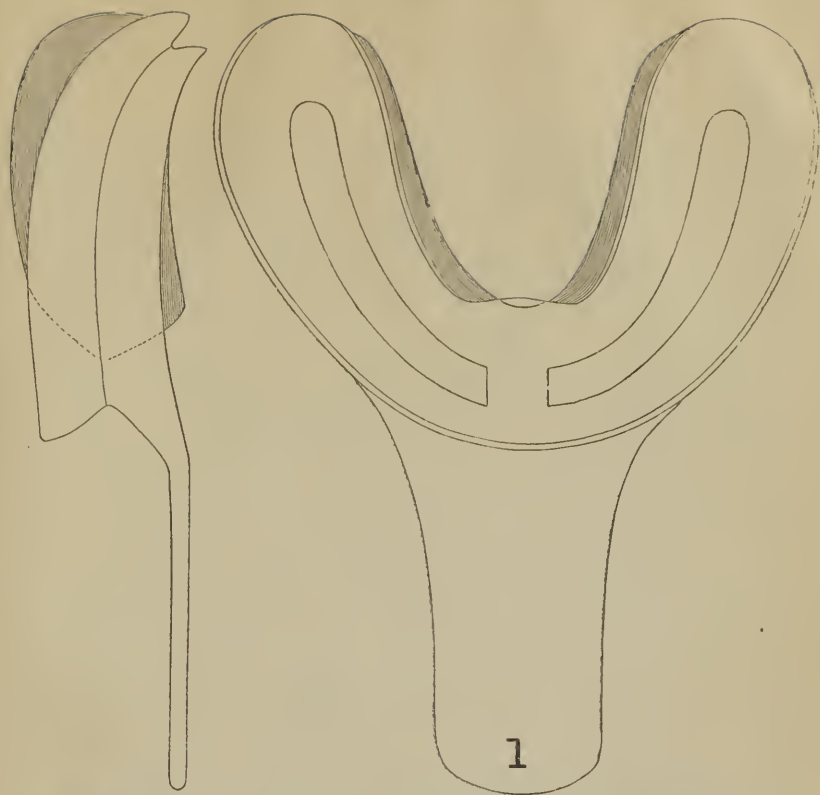
Fig. 6 illustrates Dr. B. W. Franklin's Impression Tray, of which there are three sizes, for taking impressions in plaster for lower dentures.

For description of this Tray and its use, see page 26. See, also, Dr. Franklin's letter of commendation, following these illustrations.

Price, each 75 cents.

FIG. 6.





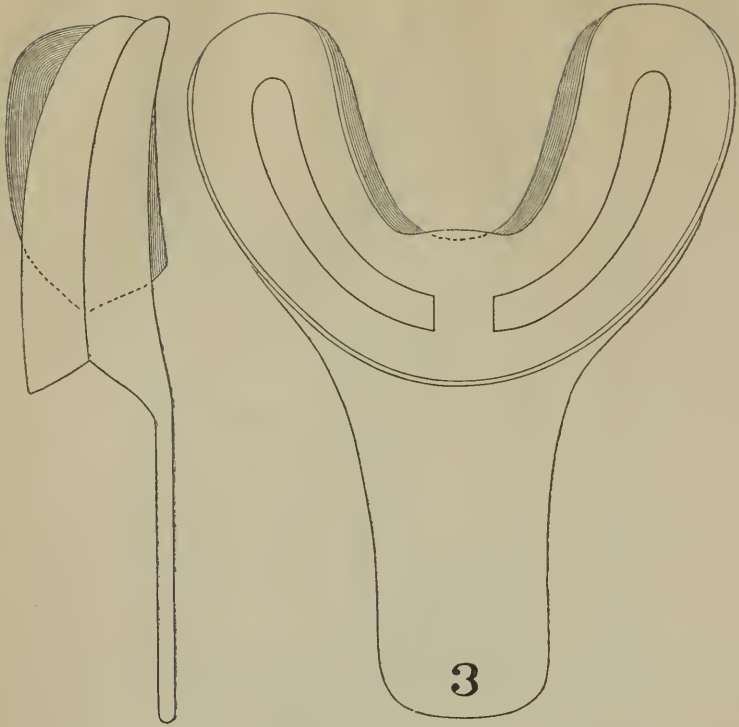
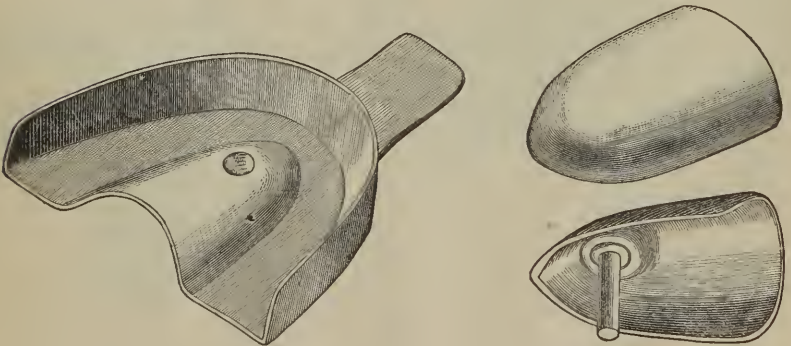


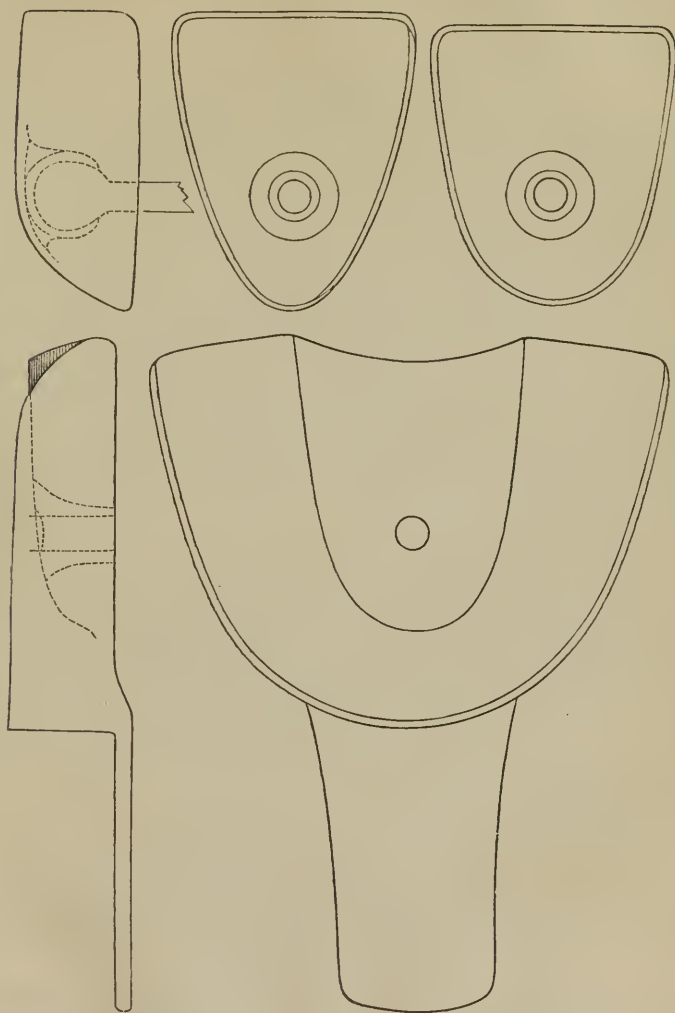
Fig. 7 illustrates Dr. Thomas Wardle's movable palate-plate Tray.
For description of this Tray and its use, see page 7. See, also, Dr.
Wardle's letter of commendation, following these illustrations.

| | |
|---|-----------|
| Price of Tray, without palate-plate . . . | 75 cents. |
| " " Palate-pieces, each . . . | 25 " |

FIG. 7.



FULL-SIZE SKELETON VIEW OF THE
MOVABLE PALATE-PLATE TRAY.



TESTIMONIALS.

FROM DR. E. WILDMAN, PROFESSOR OF MECHANICAL DENTISTRY AND METALLURGY
IN PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

S. S. WHITE. Dear Sir,—In answer to your request for my opinion of your Impression Trays: I have examined your Impression Trays, and find in the set some new patterns which present valuable features in their correct adaptability to the alveolar ridge and the adjacent parts. Their various sizes and forms, combined with the finish and good quality of metal, render them the most complete set of Impression Trays that I have met with. Yours truly, E. WILDMAN.

FROM DR. D. D. SMITH, PROFESSOR OF MECHANICAL DENTISTRY AND METALLURGY
IN PHILADELPHIA DENTAL COLLEGE.

1126 WALNUT ST., PHILADELPHIA, June 30, 1871.

DR. S. S. WHITE. Dear Sir,— . . . In shape, arrangement of handles, and general finish, these Trays are so far superior to those heretofore offered to the Profession, as at once to excite surprise that such an important matter has not received earlier consideration.

As a Practitioner, desiring to secure the best results with the least trouble, I am rejoiced at the advent of these great improvements in Impression Trays.

Very respectfully and truly yours, D. D. SMITH, D.D.S.

FROM DR. P. H. AUSTEN, PROFESSOR OF DENTAL SCIENCE AND MECHANISM IN
BALTIMORE COLLEGE OF DENTAL SURGERY.

BALTIMORE, July 3, 1871.

MY DEAR SIR,—Your New Series of Impression Cups is the most complete I have yet seen. The service you have thus rendered the Profession will be appreciated by all who recognize the great importance of a full and varied assortment of Cups.

The Curved Edge of the full Upper Cup is a very decided improvement; and the entirely new form of the full Lower Cup is most admirable. I am pleased to see so many Square Rimmed Cups,—an old form,—the great value of which has been, in late years, much overlooked.

The Cups are rigid enough for wax, yet so pliant as to be readily adapted to a variety of cases. The handles have a length and form which will much facilitate the removal of the Impression.

All the Cups of your Series are useful, and should be purchased, like other Series, in "full sets," the which, as dentists like very well to make, they should not object occasionally to buy.

DR. S. S. WHITE.

Very truly yours,

P. H. AUSTEN.

FROM DR. B. W. FRANKLIN.

FRANKLIN'S DENTAL ROOMS, No. 345 SIXTH AVENUE, }
NEW YORK, June 6, 1871.

SAMUEL S. WHITE. Dear Sir,—I have examined the Trays made by you, known as "Franklin's Improved Impression Trays," and highly approve them. They meet my ideas better than any I have heretofore seen.

The handle is of proper length and in right position, clearing the lip and allowing the Tray to set down on the maxillary ridge. The edges of the Trays are so thin that they can be shaped to the maxillary by a pair of pliers, and may thus be readily adapted to different conformations.

The three sizes you manufacture seem to me to meet all the requirements.

Very truly, etc.,

B. W. FRANKLIN.

FROM DR. THOMAS WARDLE.

PHILADELPHIA, June 27, 1871.

SAMUEL S. WHITE. My dear Sir,—In reply to yours of this date, I have to say that I am very much pleased with the Trays known as "Wardle's Movable Palate Plate Trays," which you are now manufacturing.

They are very much superior to any I have seen heretofore, and carry out my ideas entirely.

I thank you for so completely "filling the bill."

Yours truly,

THOMAS WARDLE M.D.

PORCELAIN TEETH.

WHAT WE CLAIM.

For the Teeth which we are now offering to the profession, we claim superiority over all others in the market. In all the essential characteristics which Artificial Teeth should possess, we believe them to be unequalled, combining not only those qualities which render them easy of adaptation and articulation, but naturalness of form, color, and arrangement. We claim also that, by reason of their composition, and the size, number, shape, and insertion of the platinum pins, they are stronger than those of any other manufacture.

A vast variety in shape, size, color, etc. gives opportunity for selection adapted to almost any possible case, including even the extreme cases which are sometimes met with; also, a beautiful series of those various deviations from a uniform regularity which are so common in natural dentures.

We also call special attention to our new

FOOT-SHAPED PIN.

Of this improvement PROF. AUSTEN thus speaks in the edition of "Harris's Principles and Practice of Dentistry" just published:

"As no piece of Mechanism can be stronger than its weakest part, there should always be such a relation between the tooth substance and the pins, as to shape, size, and angle of insertion, that one will be as strong as the other, and both sufficient for all legitimate uses. This strength of pin, without loss of strength in the tooth, characterizes a recent and valuable improvement made by Dr. S. S. WHITE, and known as the 'Foot-Shaped Pin' illustrated in cut. The thickest part of this pin is at the angle or heel; the point, or toe, runs upward into the thick part of the tooth, giving additional security against its



being drawn out. The insertion of the pin at an upward angle beds it in the strongest portion of the tooth material; thus any weakening of the thin portion of the tooth is avoided, as when the headed pin is inserted in a straight line; also, the greatest amount of material is found where the greatest strain is brought to bear upon it. The force of mastication is exerted outward and toward the necks of the teeth; thus the shape and direction of this pin are best calculated directly to oppose it. It will also be noticed that its direction and unusual length of insertion permit a close grinding of the tooth, which would cause the usual short and horizontal pin very soon to break away from the porcelain. The double-headed pin, a previous patented invention of Dr. White, was a very great improvement in the shape of tooth pins; but we think it is destined to be superseded by the new 'Foot-Shaped Pin.'"





These cuts represent sections of teeth in our possession bought fairly of other makers, and ground down to the middle of the pin. Comparison of these with the cuts of ours renders comment unnecessary, either as to the shape and usefulness of the pin, or the quantity of platinum used.

We are receiving abundant testimony from the profession as to the superiority of our Teeth, and Medals, Certificates, and Diplomas from Institutes and Fairs, the committees of which, after thorough examination, have recommended the highest premiums to be awarded us for excellence and superiority over all competitors.

We claim, in brief, that our stock, in quality, quantity, and variety, can not be approached in any other establishment in the world.

SAMUEL S. WHITE.

DENTAL INSTRUMENTS.


These Trade-marks at the head of a page or an advertisement, or stamped or placed upon any instrument or machine, indicate that the article is made for Samuel S. White by Henry Coy.


At the Fair of the American Institute, New York (Exhibition October, 1869), the First Premium was awarded to us for
SUPERIOR DENTAL INSTRUMENTS.

At the Fair of the Maryland Institute, Baltimore (Exhibition November, 1869), a Gold Medal was awarded to us for
EXCELLENCE OF DENTAL INSTRUMENTS.

At the Cincinnati Industrial Exposition (Exhibition of October, 1870), the Premium was awarded for Superiority in Dental Instruments, the Judges reporting as follows:

“In the competition for Dental Instruments, we unhesitatingly recommend S. S. White, *as first in merit.*”

Extract from Report of the Committee on Instruments of the American Institute:

“We have carefully examined the Dental Instruments exhibited by S. S. White, and find them of superior finish and excellent temper. We would particularly mention the perfection with which the burs and the serrations on the points of the filling instruments are cut: the shapes of the various kinds of filling instruments are admirable. In accordance with the wish expressed by the Board of Managers, we were very particular in testing the temper of these instruments, to ascertain if this important point had been attended to with the same care and skill as were evident in the other parts of their construction, and we found that in this particular their manufacture had been as carefully conducted as in the other parts, and that the instruments had the varieties of temper best suited to the purposes for which they were constructed. And we pronounce them to be the best we have ever seen produced by any manufacturer of Dental Instruments.”

Report to Illinois State Dental Society, by Committee on Instruments and Appliances:

“Some of the finest specimens of Instruments the Committee have ever seen are exhibited by S. S. White.”

Extract from a Report of the State Dental Society of Pennsylvania, June, 1870:

"The fine points were examined by the members present with the aid of a magnifying-glass, and universal commendation expressed of the superiority in their manufacture."

Report of the Committee appointed by the South Carolina Dental Association, to examine the Instruments and Specimens presented by S. S. White:

"They have examined the instruments with care and severe scrutiny. They have magnified the serrations of the mallet pluggers, and find them *regular, smooth, even, sharp, well defined, and well tempered.*

"The excavators were subjected to severe pressure,—many times greater than they would be put to in any operation in the mouth. One delicate hatchet excavator cut with ease a piece out of the untempered handle of another without exhibiting any dullness, mar or hack. The finish of all these instruments is beyond our criticism."

CLEVELAND, Dec. 29th, 1870.

SAMUEL S. WHITE.

DEAR SIR,—Please accept sincere thanks for the new set of finely-wrought Pluggers. They are *now* up to my present conception of the highest degree of excellence of a Mallet Plugger. I am highly pleased with the entire features of the instrument, especially the serrating. No other copies of my points or instruments that are in the market have ever received my approbation, they being inferior in manufacture, having been made without my patterns.

As ever,

C. R. BUTLER.

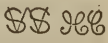
NEW YORK, February 9th, 1870.

SAMUEL S. WHITE.

DEAR DR.—Please accept my heartiest thanks for those *exquisitely-wrought* Pluggers. They come so near my present ideal in their manufacture, that I have nothing to wish in that direction. No other copies of my points that have come under my observation will successfully stand anything but careless or hasty examination. Heretofore I have felt *obliged* to make my own plugger points, but that necessity no longer exists, as your recent productions "fill the bill;" and as the price you have put on the set is so reasonable to the mind that appreciates their *delicate accuracy* of serration, no amateur can afford to spend his time and eyesight in making his own.

I am truly, etc.,

R. W. VARNEY.

All of the Dental Instruments and Machinery exhibited at these Fairs and Associations were selected out of the regular stock on hand and for sale. Not a single article was made especially for exhibition, but they were all in every point of make and finish a part of the same supply of goods bearing the Trade-marks  from which we fill orders to customers.

SAMUEL S. WHITE.

HARD CUTTING INSTRUMENTS

FOR EXCISING AND DRESSING ENAMEL, AND FOR
SHAPING CAVITIES IN TEETH.





The best men of the Dental Profession are always conservative. They hold to, and teach, all the good which they have received from "the fathers." A radical innovation, even if it be of great merit, is at first taken up by them supplementarily, used where its applicability is plainly seen, and, being found useful, replaces older methods. Filling teeth in olden times was simply stuffing a hole, from which carious and softened dentine had been scraped out. Those who learned that a better preparation was needed got to use files and burs with which to effect the work that could only be done by hard instruments—for excavators were all made with thin, sharpened edges.

More than twenty years ago Dr. Maynard, of Washington, laid down the dogma that tooth enamel could not be cut,—that it could only be split, or scraped and powdered away, in dental operations in the mouth. He made and used instruments of *full hardness* with edges at right angles. With these tools he was himself able to dress the edges of a cavity, separate teeth, or remove superficial caries successfully; and he sought to teach others their use. We know that he made such instruments, and gave them to Dr. Arthur, Dr. Garrett, and Dr. Jack, explaining to them the method of using them with the "push-cut," or engraver's thrust. Dr. Coffin, of London, made and showed to visitors from America instruments of this hard sort with square edges, of improved form. These were spoken of here, and caused Dr. Maynard's plan to be practiced with forms of instruments which he had not indicated; and a few working pioneers were thus able to emancipate themselves almost wholly from the necessity of using files or burs.

Dr. Jack, by the use of such instruments of his own making, carried into practice his most ambitious wishes in saving many teeth, by cutting away slight caries in such a manner that the dressed surfaces could not afterward come in contact. A fair idea of his method with such instruments—as also that of several very eminent practitioners, given in their own words—may be found in the report of a short debate which followed a lecture on the prophylactic treatment of teeth, by Dr. Arthur, before the Odontographic Society of Pennsylvania. (See DENTAL COSMOS, July, 1870, page 348 *et seq.*)

Dr. Head, Demonstrator of Operative Dentistry, Philadelphia Dental College, coming in contact with Dr. Jack, conceived the idea of adapting a modification of these *full hard* instruments, and made a set of excavators intended to be used for cleaning and preparing cavities, and also to pare enamel. They are all shaped to be used with the "push-cut," are very hard, and have the cutting edges very obtuse.

Dr. Wetherbee, of Boston, also did a similar work for his class, except that his set is not shaped exclusively for push-cutting.

Until a very short time ago, however, all these workers were obliged to make such instruments for themselves. There were no manufacturers who could or would produce them for sale. In fact, the methods of working steel into dental instruments, for sale, were unsuited to produce such hard tools, in quantity, of uniform hardness or similarity of form. Just when our brand of — dental instruments and machinery began to be introduced, Dr. Head was ready with his patterns, and his class was eager for copies of them.

A few sets had been made in the common way, and their true use and success was endangered by the unfitness of the work, material, and temper.

Dr. Head exhibited and explained his instruments to J^W, and described how he wanted them made, and gave him his own set prepared purposely with the temper-color left on. The sale of these instruments was very great from the first, and has been large ever since. Dr. Head was fully satisfied with the way in which his ideas were carried out, except the wish that they might be still harder than we make them; but the truth is, that the forms of Dr. Head's and also of Dr. Wetherbee's excavators are unsuited to full hardness. They are made for sale; they go out over the whole world to dentists who are used to thin-edged instruments of forms very closely resembling them, and who will grind them thin and complain if they break. They are formed with angles, and will break unless drawn down in temper at those corners. They are useful as a "transition stage." They are teachers themselves, and prepare those who get them for the use of yet harder instruments of forms exactly suited to that condition.

Noting at once the quality of the work in Dr. Head's excavators, Dr. Jack was encouraged to have made a set of chisels, on the invention of which he had expended much time and ingenuity. Dr. Jack knew precisely what he wanted, and from a rough sample, wooden models, and pencil drawings, J^W was able to realize his idea, and that unique set known to the profession as DR. JACK'S SET OF DOUBLE-END CHISELS was issued.

These chisels have very marked peculiarities in form and application. They are intended to be used for separating, and also for dressing, the edges of approximal cavities. Each one is a pair, for the special use its shape indicates, having a right and left end. The form of the middle piece is an exquisite device of Dr. Jack, securing to the operator in the push-cut—being held as a pen is held in writing—the extremest stability in use with the least possible weight.

Dentists who have not used these double-end chisels can scarcely appreciate the advantage (in separating molars, for instance) of being able to work right and left without the distraction and loss of position caused by laying down one chisel and taking up another.

They are almost *full hard*. The edge is first made long as for a chisel of common temper; then a second smaller edge is struck at an angle of about 70 degrees; this allows them to enter and cut in a very narrow place, and the labor of sharpening is also much reduced. Before hardening, but after being entirely shaped, the face intended to form the edge is hammer condensed. This gives a film of very hard steel, which is not polished off, and only the back of the cutting end is drawn in tempering, it being chilled the instant color shows on the face. The final edge is struck on an oil-stone, so that neither the hammered face, nor the edge, incurs the risk of being drawn on the polishing wheels.

If we were treating only of the form and adaptability of chisels, it would be proper here to say that the six straight and six curved chisels of Dr. Abbott, issued exclusively by us from patterns supplied by the doctor himself, and some of those of Dr. Goodwillie, were markedly useful. Their edges, however, are not formed to such angles as would enable us to class them as, or make them, *full hard*. They, however, as well as all our recent issues of cutting instruments, are made of steel, which permits them to be left harder by several degrees of temper than those by *other makers, or our own previous makes, in thin-edged instruments.*

Having succeeded in making the double end chisels fit for his own use, and also in giving them to the profession, Dr. Jack experimented in the use of extremely hard instruments with which to prepare cavities for filling. Starting with a suggestion of Dr. I. Forbes, that the gouge had been useful to him,—he has worked out of the angular bends and minute points of old-fashioned excavators by which Dr.

Head was trammelled, and has, during two whole years while developing his method for filling approximal cavities, studied the limitation, in his practice, of the application of strong, hard tools, for effective excavation of cavities. (See DENTAL COSMOS, April, 1871.) The cut made by the gouge face was too obtuse, and this led him to the adoption of the paraboloid form, which is essentially *the corner of a chisel standing alone*. With it very fine lines can be cut, narrow fissures opened, and retaining-grooves formed on and around the edges of approximal cavities. They are hard enough to dress enamel or to split it, if properly stoned, and their thickness is so proportioned to their length, that no vibration can occur in their use to break the edge or distress the patient. Their direct use as chisels is manifest, and the cuts accompanying the advertisement sufficiently indicate that use, and also the size, shape, and angle of each chisel. But in practice their use is by no means limited to the direct push-cut. Edge down, they are very much used to pare the bottom and lower corners of cavities; sidewise, to pare and carve fissures; and "*back up*," to excavate and groove the "*far side*" of an approximal cavity. As, however, in this last use they require some force, which in very thin shells would be dangerous, Dr. Jack recommends using the "supplementary," Nos. 13 and 14, for grooving small or thin cavities. These, as shown in the cut, are made and sold as *excavators*. Anticipating a very large use for them, we have made them of small octagon steel, and put them at the same price as other *extra hard* excavators.

All of these, Nos. 1 to 14, and also the "double-ends," are made of a brand of steel which we alone have in form for Dental Instruments. It is made for us only. With it we are able to make such edges as common steel would not bear at all. Beside this quality of steel, to start with, the work at every stage—forging, annealing, shaping, hardening, and tempering, as well as the final polishing—is done without any regard to the cost of producing a really first-rate cutting tool.

We expect these chisels will go into the hands of the best dentists in the world, old and new; and feel not only anxious to sustain the great reputation our instruments have achieved, but to attain on these a greater one.

One word as to these Nos. 13 and 14 instruments. We anticipate a great sale. They are in everything but size as costly as the larger ones. Such steel can only be used ONCE in any of them for this purpose; it is nonsense to expect that it can be made over and over again to hold its edge at such hardness. The larger ones will wear a long time. The supplementary will go into extended use as excavators, and are so small, that they will wear out sooner. They can be made over, or re-pointed, into any form of lower-tempered instruments, but we *cannot* re-point any of them for their place in this set.

HARD BITS.

Having trained upon the instruments previously mentioned, we aspired to complete this line of *Hard Cutting* Dental Instruments by bringing into one small set some new forms suited to being made absolutely FULL HARD, called by some "*glass hard*." In these we have sought to unite the original idea of Dr. Maynard with the practical suggestions of Dr. Coffin, of London, as reported to us, and also those of Dr. Arthur, Dr. Garrett, and Dr. Jack.

Mr. [unclear], gathering up these teachings, aided by drawings from some, and the inspection of the few instruments heretofore in use by others, has arranged the sizes, shapes, curves, and end-forms of this set himself, believing that he has therein embodied all which is yet known or practiced. Dr. Jack sustains this opinion. He says: "There are some forms I never before saw or heard of among the users of hard instruments; but I want the whole twelve, and do not wish to add any

other." The twelve instruments comprise four groups. Each group differs in end-form. Each of the three in a group differs from the other considerably in width, and very little in thickness.

The drawings (see page 85) show the exact size and form; and the sectional drawing, which shows the curved ends of the last group, shows also the thickness of the three sizes in all.

The first group having plain, square ends, and the second group with slant ends, are more especially designed for paring off superficial decay. The third group has its ends formed for opening fissures. The fourth is the suggestion of Dr. Arthur, for paring down the enamel edges of cavities.

All of them are used, also, to excavate hard dentine and for separating. In skillful hands they almost entirely supplant the file and bur. The edges of all are plain right angles, square with the flat sides. They are to be sharpened by stoning square on edge. In use, being set in the socket, and held as a pen in writing, the square, sharp edge is worked rapidly against the part to be removed so as to powder it away. They are thin enough to bend, and if always sharp, do the work with amazing ease and rapidity; of course no one will test the bending quality of such hard instruments any further than is required to make them *bite into the cut*.

The size and style of these Bits as fixed by us and shown in the drawings, we do not propose to alter. We cannot procure steel of which to make them with handles; and if we could it would be undesirable, as we cannot re-work or make over tools of this hard temper. We therefore adapt them to a Socket-handle, as shown in advertisement, and to meet the wants of those who, instead of changing, wish a handle for each Bit, we have made a 3-16 cast-steel handle, which will sell at twenty cents each. The round part of the Bit is straight, not coned; and the size will be maintained by us for these Bits and Sockets with exactness. Should they wear loose, they may be set with shellac.

Apart from the fact that many dentists desire to have these Hard Bits with ivory or ebony handles, if they were drawn down from steel as large as the handle, so much forging on such delicate steel as is required would sometimes result in a bad instrument, and we should lose enormously in testing; but by making the Bits separately we gain every way. We wish here to say explicitly that we never make cutting instruments of wire or wire-drawn steel in any shape. These Bits are made of minute, square cast-steel bars, which is said to be the very smallest tilting ever done; hand-hammered below that, and only finished, in the rolls. We make them without any forging or annealing; file the rounds, and spread the blades which require it—cold; harden thick and grind to shape. We do not believe that instruments fit to do such work can be made of inferior material, or by any cheaper method of working.

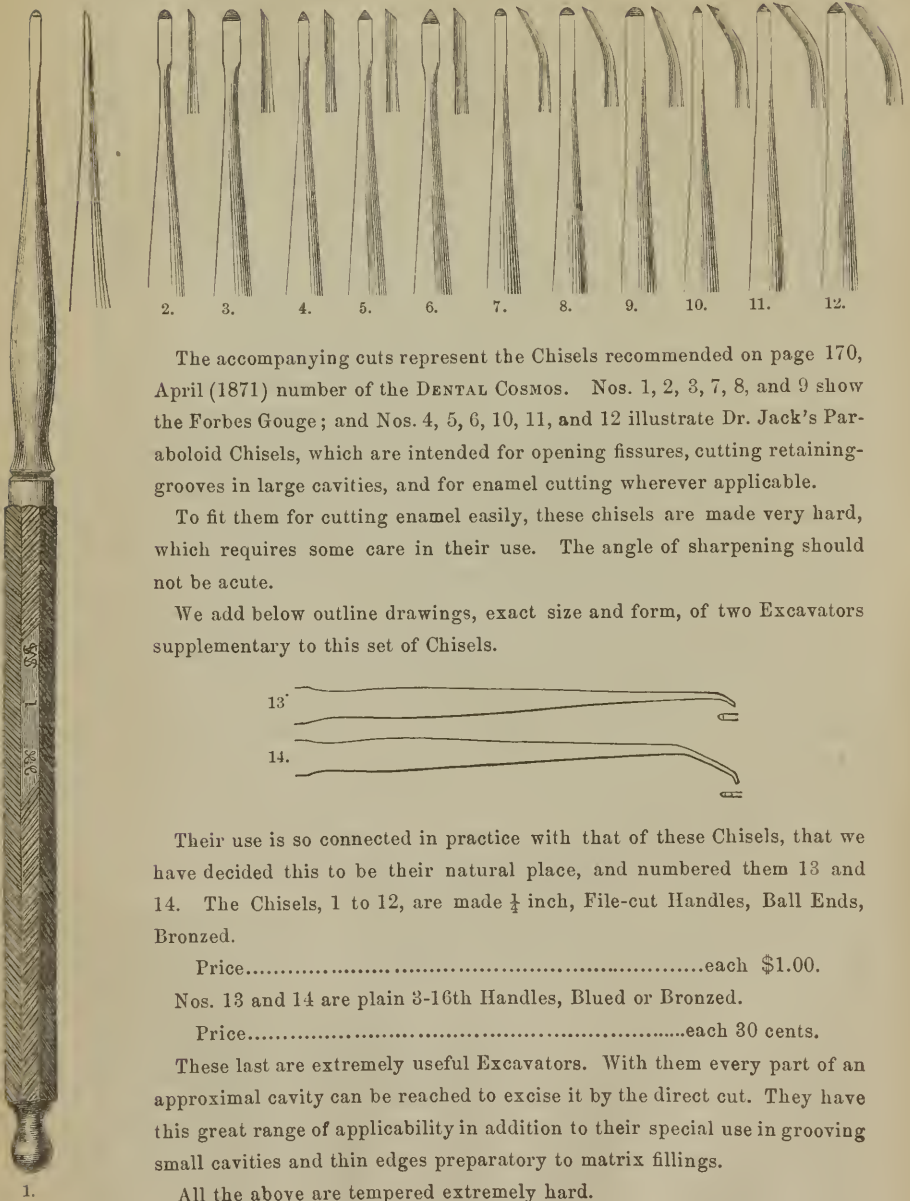
Stating our method will not injure us in any way. To amateurs or manufacturers who follow it, the product will cost our prices if made in small lots. Those who attain to our standard by any cheaper method will be entitled to the profit and the trade.

In conclusion, having given full credit to the inventors and designers of these instruments, we have no doubt that the dental profession will recognize our enterprise in working them out, and bringing them thus with *full explanation* to their hands, and will be ready to give them a careful trial. No such line of instruments as these has ever before been made for sale. They are warmly eulogized by those distinguished pioneers who, to get such at all, had to sacrifice their own valuable time in making them.

We now present the Illustrative Cuts and Price-Lists of these Hard Cutting Instruments.

SAMUEL S. WHITE.

DR. JACK'S PARABOLOID AND DR. FORBES'S GOUGE CHISELS.



The accompanying cuts represent the Chisels recommended on page 170, April (1871) number of the DENTAL COSMOS. Nos. 1, 2, 3, 7, 8, and 9 show the Forbes Gouge; and Nos. 4, 5, 6, 10, 11, and 12 illustrate Dr. Jack's Paraboloid Chisels, which are intended for opening fissures, cutting retaining-grooves in large cavities, and for enamel cutting wherever applicable.

To fit them for cutting enamel easily, these chisels are made very hard, which requires some care in their use. The angle of sharpening should not be acute.

We add below outline drawings, exact size and form, of two Excavators supplementary to this set of Chisels.

Their use is so connected in practice with that of these Chisels, that we have decided this to be their natural place, and numbered them 13 and 14. The Chisels, 1 to 12, are made $\frac{1}{4}$ inch, File-cut Handles, Ball Ends, Bronzed.

Price.....each \$1.00.

Nos. 13 and 14 are plain 3-16th Handles, Blued or Bronzed.

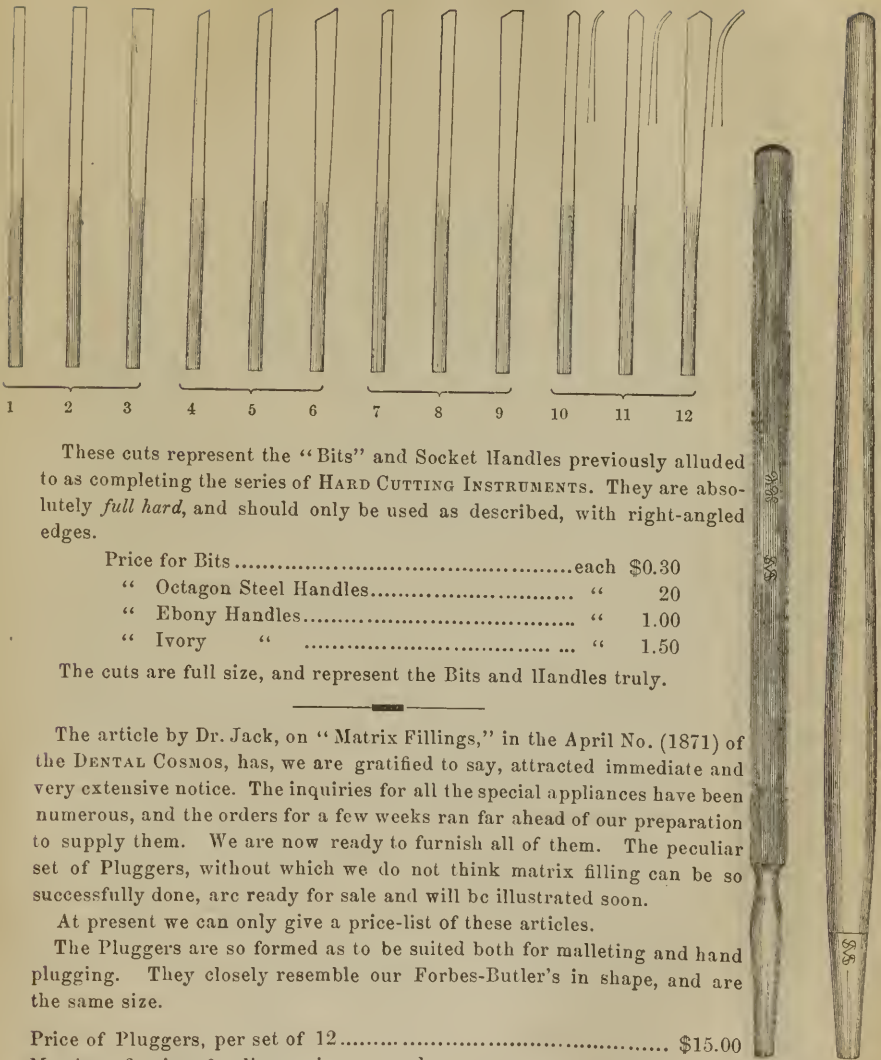
Price.....each 30 cents.

These last are extremely useful Excavators. With them every part of an approximal cavity can be reached to excise it by the direct cut. They have this great range of applicability in addition to their special use in grooving small cavities and thin edges preparatory to matrix fillings.

All the above are tempered extremely hard.

SAMUEL S. WHITE,

HARD BITS.



These cuts represent the "Bits" and Socket Handles previously alluded to as completing the series of HARD CUTTING INSTRUMENTS. They are absolutely *full hard*, and should only be used as described, with right-angled edges.

| | | |
|------------------------------|------|--------|
| Price for Bits | each | \$0.30 |
| " Octagon Steel Handles..... | " | 20 |
| " Ebony Handles..... | " | 1.00 |
| " Ivory " | " | 1.50 |

The cuts are full size, and represent the Bits and Handles truly.

The article by Dr. Jack, on "Matrix Fillings," in the April No. (1871) of the DENTAL COSMOS, has, we are gratified to say, attracted immediate and very extensive notice. The inquiries for all the special appliances have been numerous, and the orders for a few weeks ran far ahead of our preparation to supply them. We are now ready to furnish all of them. The peculiar set of Pluggers, without which we do not think matrix filling can be so successfully done, are ready for sale and will be illustrated soon.

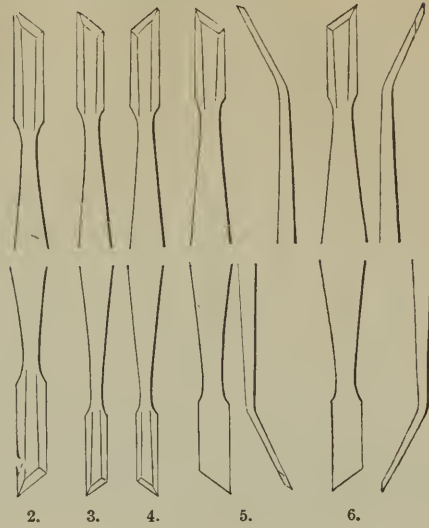
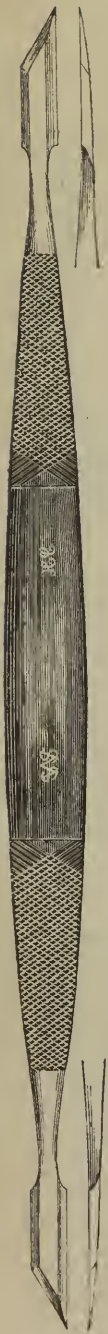
At present we can only give a price-list of these articles.

The Pluggers are so formed as to be suited both for malleting and hand plugging. They closely resemble our Forbes-Butler's in shape, and are the same size.

| | |
|--|---------|
| Price of Pluggers, per set of 12 | \$15.00 |
| Matrices 6 pairs of ordinary size are made.....each | 50 |
| 1 pair extra large..... | " 50 |
| Double, or Two-sided Matrix..... | " 75 |
| Pliers for Setting Matrix..... | " 2.00 |
| Boxwood, Flat and Square Slips, for Wedging Matrices, 6 inches long..... | " 2 |
| Large Slips of Choice Box for Making Matrices, 6 inches long.. | " 5 |
| Round Boxwood for Porte Polishers..... | " 1 |
| " " in Boxes and put up same as Pivot-wood...per box | 50 |

SAMUEL S. WHITE.

DR. LOUIS JACK'S DOUBLE-END ENAMEL CHISELS. SET OF 6.



We herewith present Cuts of Dr. Jack's Chisels. They are not new, but have already, during eighteen months in which we have made them, attained peculiar celebrity. The care in the selection of steel, and the extreme caution and skill required in working it, to make instruments which cut across enamel, *and stand it*, so limit our ability to supply the demand that we have refrained from advertising them.

The pattern of handle, so formed as to give security in use, and the points, are exclusively the invention of Dr. Jack, the "double end" constituting each tool a pair of Right and Left instruments for the same cut. The *set of 6* is designed to furnish all the forms needed for freely cutting the enamel in separating the teeth. No. 5 is more particularly intended for cutting down the inner distal surfaces of the molars; No. 6 is for the same purpose on the inner mesial surfaces of the same class of teeth.

In tempering, we make them as near to the hardness Dr. Jack prescribes as we judge possible or safe in work.

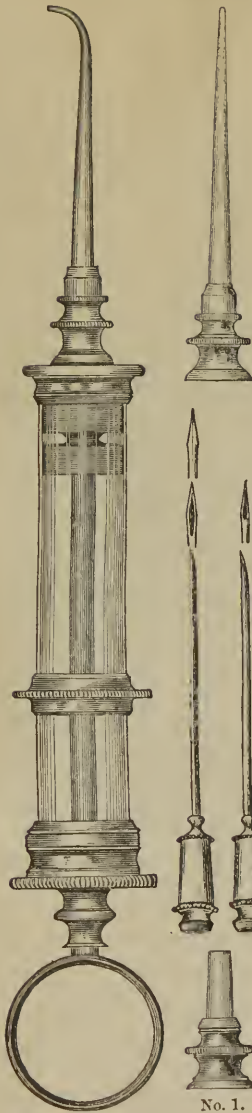
The immediate edge should be removed at an angle of 70 or 80 degrees after each dressing on the grinding stone.

Price.....each \$2.00

SAMUEL S. WHITE.



HEAVY GLASS OFFICE SYRINGE.

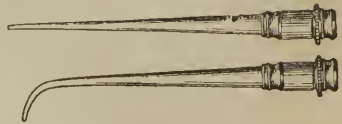


No. 1.

HYPODERMIC SYRINGE POINTS.



No. 2.



ABSCESS SYRINGE POINTS.

Recognizing a demand, not yet supplied, for a good Dental Syringe at a moderate cost, and having carefully considered the kinds in use and the objections to them, we have added this Heavy Glass Syringe, confident that it will give satisfaction. It is shown of full size in the cut.

Rubber Syringes have been sold in large numbers, but they soon wear out,—that is, they wear large in the bore, at the part most used, and when so worn a perfect packing cannot be put in them.

Glass is a very suitable material, wears well, and is cleanly, pleasant, and safe. Heretofore all the Glass Syringes offered to dentists have been too frail; made of common thin tubing, not uniform in bore, and badly annealed.

The diameter is a consequence of the great thickness of the tube; the bore is no larger than is necessary to make a good packing. The tubes are such as are used in gauges for steam-engines and other exact apparatus,—the best glass, the most perfect form and exact bore we can procure Besides the annealing at the glass-works, we anneal it after cutting it up.

The parts are sized and fitted to correspond, by the use of extra hubs, with our standard gold, silver, platina, and iridium points, and also for the hypodermic injection-pipes. With the addition of these points it may be used not only for washing out cavities, but also for injecting the various solutions used in the treatment of abscesses, and as a hypodermic syringe.

It is exclusively the design and work of "Instrument-Shop." It is extremely well made, the metallic portion being of fine German silver, heavily silver-plated.

This is the best cheap Syringe we have yet seen, and it is recommended as combining neatness, durability, and an extensive range of uses, with economy in first cost.

| | |
|---|--------|
| Price, with one Point, straight or curved | \$3.50 |
| Extra Points.....each | 50 |
| Tips or Hubs....." | 50 |
| Hypodermic Syringe Points....." | 75 |
| Gold (18k.) Abscess Syringe Points, straight or curved....." | 2 50 |
| Platina, and Iridium, Abscess Syringe Points, straight or curved .." | 1.75 |
| Plain Gold Points, such as are on Common Hard-Rubber Syringe .." | 2.25 |
| Plain Coin Silver Points, such as are on Common Hard-Rubber Syringe....." | 50 |

The No. 1 Hub or Tip fits the Hypodermic and Abscess Points; No. 2 fits the Plain Gold and Silver Points.



SAMUEL S. WHITE.

THE REDMAN FOUNTAIN SPITTOON.



The cut affords a fair external view of this new and admirable Dental Office fixture, and the sectional drawing on page 91 exhibits its internal structure, and serves to illustrate what we have to say of it.

The demand for such an article by the profession was very general.

But although we were the owners of the Whitcomb and Morrison Spittoons, and all the patterns, etc. which had been used in getting them up, an examination of these, together with the imperfect working and frequent need of repair of those which were in use of the Whitcomb pattern, resulted in deciding them unfit to be issued under the  and  trade-marks. It was our desire to make and sell only one kind of Fountain Spittoon, and to have that, according to our constant rule, "THE BEST OF ITS PERIOD."

We collected information of such new and improved methods of making Spittoons as had been brought to practical shape by several ingenious dentists for their own use by personal examination, and also by photographs and drawings of others, kindly furnished.

Some completed Spittoons were also loaned to us for study. Among these last was one from Dr. Redman, who, at the solicitation of Dr. B. F. Arrington, very kindly took out of his office a handsome Spittoon, which he had built and put up with great care, study, and expense, and sent it to Philadelphia. Everything thus gathered was submitted to examination and tests in the Machine Department of Instrument-

Shop, which resulted in Dr. Redman's Spittoon being thankfully accepted as a model, and as made, ours is near enough to the original to justify the name. Externally, the resemblance is very close; internally, the plan and general arrangements are similar; all the changes which we have made being designed to secure exactly and perfectly the results and uses which Dr. Redman had in view.

Thus to choose was to reject all we had previously owned and advertised; to decline also many elegant and ingenious devices of several friends; and the decision was arrived at to exclude every complication and fancy attachment, and to make of a Spittoon only, and to make a Fountain Spittoon fully supplying the needs of the Dentist, and the patient, of such excellent construction, such good material, and simple appliance, that with proper care and use, its duration, in perfect order, would be secure.

Looking at the cut, it will be seen that it is of elegant form and free from all difficulty in keeping clean. In use it washes the basin wholly at every instant of its play, requiring that only the case and marble top shall be cared for as ordinary furniture.



An examination of the sectional drawing will show that the gold and other heavy matter must sink at once into the gold reservoir, which, being always filled with water, will separate and float away every soluble particle; the heavy stuff will remain safely without any care, and may be removed when desirable in the way hereafter shown.

The Spittoon being properly set up at the side of the chair, and a suitable head of water on, the operator can, by touching the handle I, cause the water to flow in any degree, from trickling down the stand-pipe to the full film in parachute form A, striking the basin all around, near its upper edge.

If the supply of water becomes feeble, or fails wholly, nothing is deranged or needs changing. The waste-pipe is always open, and the basin can be used, but will require washing.

There is no arrangement for drinking-water. Apart from the ill taste of drawing water to drink from the spittoon, it would require an extra pipe and faucet, mar the unity and simplicity of the fixture, which has only one proper use, and uselessly duplicate arrangements with which every dental office must be separately and already provided. Cold water for drinking, and tepid water for operating, ought to be entirely apart from the Spittoon.

The marble top is wide enough for a tumbler, yet it and the wood-work are purposely made small. Modern practice frequently requires, for operator and assistant, both sides of the chair, and a large fixture would be inconvenient.

The use of this Spittoon is not limited to cities and large towns which have water-works; wherever a lift or force pump can be rigged to fill a reservoir the size of a barrel, at a small elevation over the operating-room, it will work perfectly well and with more steadiness than from the intermittent supply of some water-works; its expenditure of water, being limited to one use, is very small, and could be supplied by a few minutes' pumping every day, where no other means were accessible.

The cabinet-ware is by one of our best city makers, and we cannot be responsible for it, except by saying that it is made a good while in advance, and has every chance to crack or split in our keeping that it is likely to have afterward. It is the very best we can get. Rosewood and Walnut veneered, finished in oil, or polished as described below.

The marble tops are of the same quality as is supplied on good cabinet-ware, and fitted carefully to the top of the wood, on dowel pins, so that it can be lifted off to empty the gold reservoir. The basins are made to order, of the best stone china. All the machinery, couplings, faucets, reservoirs, etc., excepting the iron pipe, are of our own make. They are of fine brass, silver soldered, and the exposed portions are silver or nickel-plated, as desired. We were inclined at first to buy faucets, couplings, etc. as made for and furnished to the plumbing trade,—and did so on a few,—but the result was not so satisfactory as we wished, we feared the possibility (even after going over them) of leakage or failure, and now every important part is our own work, of the best materials, from patterns expressly got up for this spittoon. We are confident that with proper use there cannot be any failure to work long and well; and that there cannot be any leakage or even dampness in the room. To make this secure, we have purposely added the couplings for the supply and waste-pipe below the base, and screwed on a diaphragm-holder to prevent the plumber or other person who puts it up from injuring the works by pulling or bending the pipes, and so damaging their connections above.

EXPLANATION OF SECTIONAL DRAWING.

W W W is the wood-work of the case.

M is the marble top.

B B B is the basin.

E E is the strainer through which the sputum is washed by

A, the sheet of water, which is let on from

S, the supply-pipe, by turning

L, the key of the faucet, which is shown full open, the water passing up to

D, the standpipe, and out of the end of it under

C, the acorn-shaped cap, easily governed so as to fall around the standpipe into the strainer, or to throw a film of water, as shown by the dotted lines at A in the drawing, and so washing down the sides of the basin.

It will be seen that everything which goes through the holes of the strainer, E, must fall into

G, the gold receiver. This being full, must then overflow all sides into

H, a brass cistern, through which and the gold receiver the supply-pipe passes, and into which

O, the outlet-pipe, opens of full size, and carries off the water and refuse into the drain.

Observe that the outlet cistern, H, although opening thus into a pipe, the size of which is twenty times as great as the holes in the strainer, E, and although its edge goes far back on the wood, and with silver-soldered joints, has above it

F, a lead funnel. This is to provide against any possible evil from back-flow, until such will show itself by rising in sight in the basin; it also guards against water dripping from the thick under boss around the hole in the basin so as to avoid the possibility of moisture reaching the wood-work of the outer case, W.

TO RECOVER GOLD.

Lift off the marble; unscrew the cap, C; then lift the basin and strainer, taking care not to injure the standpipe, D, which it is unnecessary to remove. (Observe that there are marks on the under side of the marble and upper edge of basin to guide you in replacing them) Then take the gold cup, G, by its edges and lift it also carefully over the standpipe.

Having removed the gold, replace the parts carefully, being especially careful not to break the screw-thread on the bottom of the cap, C, which would spoil the chute.

DIRECTIONS FOR ERECTING AND USING THE REDMAN FOUNTAIN SPITTOON.

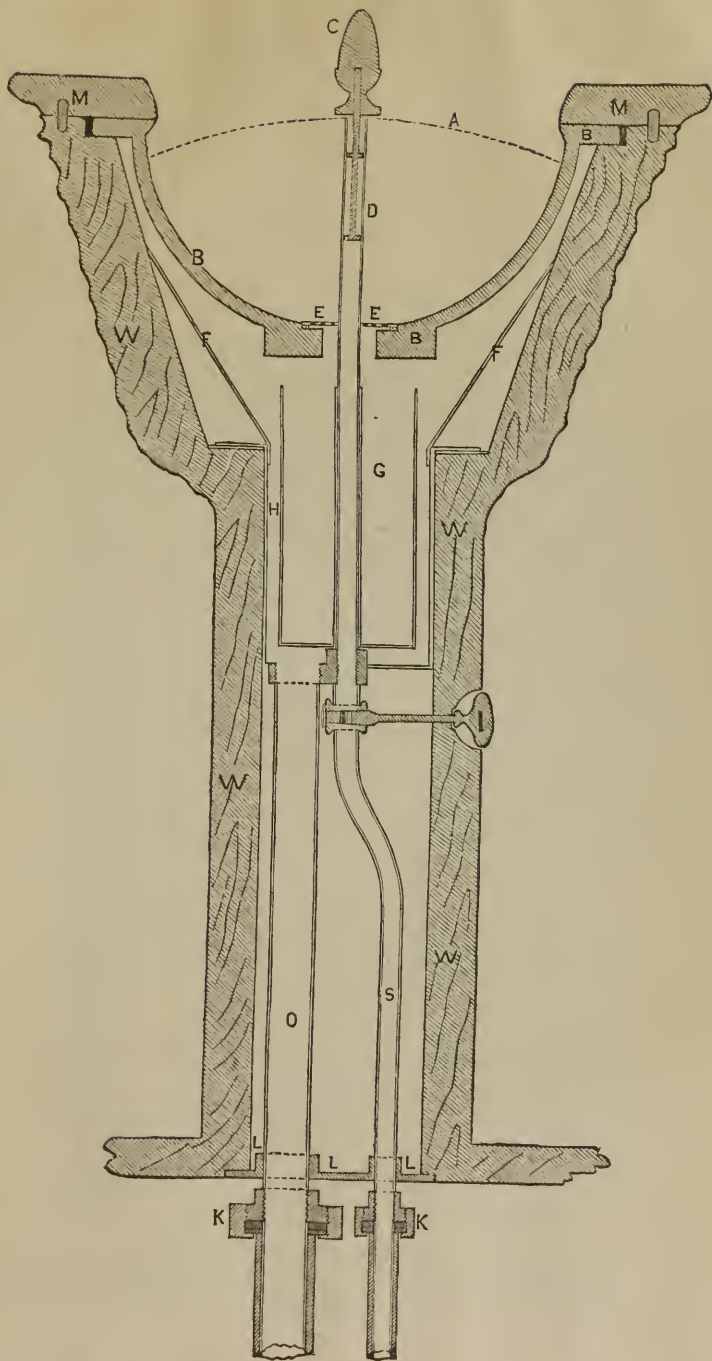
When the Spittoon is delivered, there is a square of boards on edge, nailed to the base, which protects the connection couplings from injury.

It is all ready for instant use when the attachments are made and water let on.

The marble, M, and basin, B, being removed and set aside, let the plumber lay it sideways on the floor and unscrew the couplings. He will find washers in them all ready. Do not let him do anything else. It is of no use to gratify his curiosity and risk misplacing something by "taking the thing all apart so as to understand it," as he will be apt to wish to do. Forbid him touching above the diaphragm, L, which is purposely put across the bottom, holding the supply-pipe, S, and waste-pipe, O, to prevent them from being pulled, bent, or in any other way meddled with.

Let him cut the holes in the floor, and connect with pipe of size indicated by the couplings.

Set up the Spittoon, and let it be very nearly level and perpendicular. The beauty of the sheet of water will be marred if it is set out of plumb and level.



A very good way is to have a nice piece of walnut an inch all round larger than the base, and having set it true and level on that, screw that to the base, and afterward to the floor. But to level with chips and screw it directly through the base, is the common way.

The little door on the side of the pillar gives abundant access to the plumber for holding the pipes, so as not to disturb the upper connections while screwing the lower couplings home.

If any leak does occur, it will be on account of some neglect of the sort here warned against, or of abuse; for every Spittoon is proved in the shop, with a great pressure, before packing.

Place the basin, marble, and cap correctly *in situ*; the key of the inlet faucet, I, being turned square across, which completely shuts off the water. Then, for use, screw the cap, C, nearly down. Let on the water by turning the key, I, vertical, right up and down, as seen in the drawing. That lets the water full on. Then adjust the cap, C, by very light touches until the sheet of water, A, strikes the basin, as shown in the drawing. Leaving it so, you will not, in turning the key hastily, after seating a patient, spurt the water over the edge of the marble; but may have to turn the cap down to raise the chute, if the head of water grows feeble, or set back the key if it comes too strong. It may also be adjusted with key of inlet faucet set half on; adjust the cap, C, to that pressure of water, and then, avoiding any further touching of the cap, regulate the flow to any stage you wish by the key, I, alone. Remember, however, to touch it lightly; a full turn will spatter something.

If the chute, or sheet of water, is split or twisted, it arises from some dirt or obstruction. Turn off the water, unscrew the cap, C, and wipe it and the top of the edge of supply-pipe, D, at the place where the water issues. A speck of dirt, or of metal bur on the edge of the screw, is the probable cause.

The faucet is carefully made, and put together properly with wax. A drop of sperm oil may be put on it through the door in the pillar. If after that it feels harsh and is cutting, it should be taken apart, waxed, and put together properly by a plumber or gas-fitter, the water having first been shut off. It should, however, last in good condition for a long time; and we cannot think of any other part requiring any care which a dentist himself cannot give it.

Price..... \$75.00

SAMUEL S. WHITE.

CORUNDUM WHEELS.

It affords us pleasure to inform our customers that, after considerable delay, trouble, and expense, we have succeeded in procuring a SUPERIOR LOT OF CORUNDUM, and are now prepared to supply

WHEELS, FILES, SLABS, CUPS, AND CONES,

of an excellent quality, much better than any heretofore manufactured, either in this country or England. For the use of the Dentist they seem to leave nothing to be desired, cutting so rapidly and smoothly that the hardest tooth can be ground with great facility.

THE CINCINNATI INDUSTRIAL EXPOSITION (1870)

awarded us the PREMIUM for the superior quality of our WHEELS, FILES, SLABS, etc.

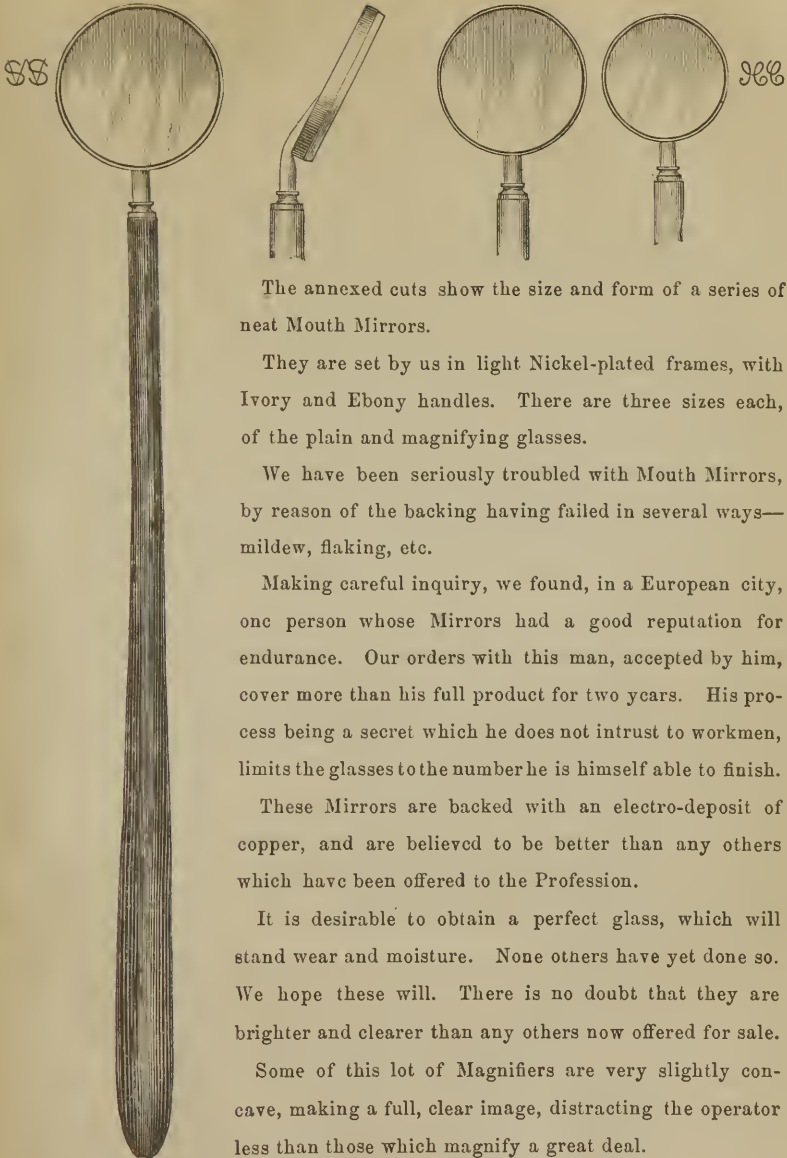
THE PROFESSION ARE CAUTIONED AGAINST

the liability of purchasing, as ours, Wheels of other Manufacturers. We have found them in a number of instances kept in the same drawers and mixed with those of other makers.

To prevent such mistakes, our new wheels have a letter "W" stamped into the material.

SAMUEL S. WHITE.

MOUTH MIRRORS.



The annexed cuts show the size and form of a series of neat Mouth Mirrors.

They are set by us in light Nickel-plated frames, with Ivory and Ebony handles. There are three sizes each, of the plain and magnifying glasses.

We have been seriously troubled with Mouth Mirrors, by reason of the backing having failed in several ways—mildew, flaking, etc.

Making careful inquiry, we found, in a European city, one person whose Mirrors had a good reputation for endurance. Our orders with this man, accepted by him, cover more than his full product for two years. His process being a secret which he does not intrust to workmen, limits the glasses to the number he is himself able to finish.

These Mirrors are backed with an electro-deposit of copper, and are believed to be better than any others which have been offered to the Profession.

It is desirable to obtain a perfect glass, which will stand wear and moisture. None others have yet done so. We hope these will. There is no doubt that they are brighter and clearer than any others now offered for sale.

Some of this lot of Magnifiers are very slightly concave, making a full, clear image, distracting the operator less than those which magnify a great deal.

| | |
|--|--------|
| Plain Glass, either size, Ebony Handle..... | \$1.50 |
| Magnifying Glass, either size, Ebony Handle..... | 2.00 |
| “ “ “ “ Ivory Handle..... | 2.50 |

SAMUEL S. WHITE.

CELLULOID BASE.

[Being in receipt of letters from all parts of the country requesting further information of the Celluloid Base, we take pleasure in giving the following, prepared by the authors to send to their friends.

That from Preterre Brothers (with the exception of some important corrections) appeared in the July number of the DENTAL COSMOS.—S. S. W.]

NEW YORK, May 12th, 1871.

DEAR SIR:

We have the pleasure of communicating to you the result of a series of carefully conducted experiments, by which we are enabled to simplify and improve the process of moulding Plates out of "Perkins & Hyatt's Celluloid Base," so that now it can be used for Dental Plates with perfect success as a substitute for Rubber.

As we do not intend to take out patents for our improvements and discoveries, but wish our friends to share in the advantages they produce, we will describe the details of two processes (either of which may be used) of moulding Dental Plates, in which we dispense with all the usual machinery, except the flask and clamp or press.

We prepare the flask, cut the channels and gates for the escape of the surplus material, select the Plate for the Base, and place it over the mould in the flask, according to the printed directions for using the Celluloid Base, with the exception that no gum is mixed with the plaster of which the mould is formed. Then commence our improvements; in both of these processes the ordinary rubber flask can be used as well as the special one designed for the Celluloid Base. In neither of them is oil used as the medium of communicating heat to soften the material, and in both of these processes the plaster mould must be ordinarily moist.

In one process the flask and material, prepared as above described, is plunged into boiling water; almost as soon as the boiling water touches the material it begins to soften, and the tightening of the clamp can commence, and they may be further tightened every half minute, until the edges of the flask are pressed close together, when the moulding will be completed, and the flask must be plunged in cold water to cool the case. Upon opening the flask, the Plate will be found as perfectly moulded as if it had been immersed in Oil at a temperature of three hundred degrees. We have moulded Plates by this process in five minutes after the water commenced to boil.

In the other process, the plaster mould in the flask must be moist, the material for the base is placed on the mould in the flask, the upper part put on, and the flask so prepared placed over a jet of gas, or the flame of an alcohol lamp; as soon as the steam begins to issue from the wet plaster, the material will be soft enough to commence tightening the clamp, and in a few seconds the two parts of the flask may be brought entirely together, and the moulding of the Plate will be completed, and the case must be cooled as already described.

In the last process, the channels and gates that are cut to receive the surplus material must be so arranged that none of it can touch the iron flask, as the flask becomes so hot that the material would ignite if brought in contact with it, and the case be spoiled. Should the material by any accident ignite, plunge it into cold water. If this is done quick enough, the case may probably be saved.

By both of these processes, the color of the plates is much nearer the natural color of the gum than when the moulding is done in Oil.

We think it is a matter for congratulation, that in the different preparations of Collodion that are known by the name of "Rose Pearl," "Pyroxyline," "Perkins & Hyatt's Celluloid Base," etc., the profession can find substitutes for Rubber in the making of Dental Plates.

So that the aims of those extortionating Companies who own the Hard Rubber Patents may be defeated, we shall always place before our friends any improvements that we may make that will tend to accomplish that object, and defeat the tyranny of those Companies.

PRETERRE BROTHERS, 159 Bowery.

FRANKLIN'S DENTAL ROOMS, No. 345 Sixth Avenue,
NEW YORK, June, 1871.

DEAR SIR:

I am being written to by many Dentists, from all parts of the country, in regard to the "Perkins-Hyatt Celluloid Base," who are anxious to find a substitute for Rubber; and it seems to me but natural that when a new Base for Artificial Teeth is offered to the profession, those residing at remote points from the inventor should make inquiry of some one who may be supposed to know something of its practical merits, and at the same time be willing to give an opinion, unbiassed by interest.

And, as I have no interest whatever in this Base, any further than the interest I naturally feel in everything calculated to lessen our labors and increase our usefulness, I take this method to give you what information I possess, and for which I am indebted to the liberality of Drs. Preterre Brothers, 1.9 Bowery, this city, having had but little experience myself in working this substance in my own practice. And I the more cheerfully do this in consequence of the spirit evinced by the Doctors to give to the profession not only the results of their large experience in working this new Base, but also their several improvements in the mode of manipulating this substance. It is believed to be sufficiently durable to make it a valuable acquisition to the Profession, and judging from cases now several years in constant use in the mouth, of the Rose Pearl Base, a similar substance, it would seem to justify this belief.

This Base is being adopted by many, and, so far as I have been informed, it gives satisfaction. The Base is composed of Collodion and Gum Camphor, and probably some other gums or substances; according to the "Circular," it is to be pressed into Dental Plates in plaster moulds, from cured forms approximately shaped under heated oil at about 300 degrees, Fahr. But the experiments of Preterre Bros. have fully demonstrated that boiling water is equally as effectual as hot oil, and more pleasant to manipulate. They use the Howell Packer in cases of great absorption, when more material is required than is furnished in the cured plates. They also use this substance for repairing all rubber cases. They have implicit confidence in the utility of this base, and if it proves as good as many believe it to be, the Drs. Preterre certainly are deserving of great credit for their efforts in rendering this the most manageable of all the substances heretofore used as a base for Artificial Teeth.

A good practical case can be packed in five minutes, with no other apparatus than a common rubber flask, heated over a gas jet or alcohol lamp, with or without boiling water, although the apparatus furnished at the Dental Depots is well adapted for the purpose, the Thermometer left out.

Truly, etc., B. W. FRANKLIN.

The following suggestions are offered, by one who has used both oil and water, to guide experimenters:

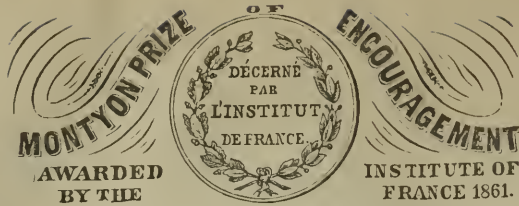
In the process of making artificial dentures with the Celluloid Base, the teeth are ground to a base plate of wax or gutta-percha, and placed in the flask in the same manner as in making a case of rubber.

As it is necessary to use rather more force to screw the flask together than is used with rubber, there is more danger of opening the joints or displacing the teeth: therefore, in filling the flask, *more care* should be taken to have the plaster *stiff* enough to prevent its shrinking from the teeth, or sides of the flask, as it will do when used thin.

When the case is ready, and the plaster *well set*, place the Celluloid plate in the teeth part of the flask, and the cast part upon it; set it in the clamp and screw down carefully, just enough to hold it in position. Then place the clamp with flask in the *tank*; cover with oil or water, and apply heat; if oil is used, heat to 300°; if water, heat to boiling, when the clamp may be screwed down carefully, a little at a time, more time and care being required with water than with oil. When the flask is *entirely closed*, place the clamp with the flask in cold water. Do not unscrew the clamp until the flask is *quite cold*. If the plate with the teeth is taken out before it is *cold*, it may twist or warp.

Scrape and polish as with rubber, finishing with chalk on cotton wheel. For the finishing touch, use a cone (made of *felt*), dry; no polishing powder with it. Avoid the use of very coarse files, as the material has a tendency to drag, and deep cuts are hard to remove.

One of the advantages of water over oil is, that any number of pieces, or scraps, may be moulded together,—a valuable quality when repairing sets.



PHÉNOL SODIQUE.

This Preparation is recommended as a prompt and reliable
HÆMOSTATIC, ANTISEPTIC, AND DISINFECTANT.

Used externally as a dressing for all kinds of WOUNDS, CUTS, BURNS, SCALDS, CHILBLAINS, EXCORIATIONS, VARICOSE VEINS, VENOMOUS STINGS, or BITES; as an astringent and Styptic application in HEMORRHAGES, as after EXTRACTION of TEETH, and to prevent subsequent soreness of the gums; as a wash for the mouth, in cases of DISEASED GUMS or APHTHOUS conditions, or to DISINFECT an OFFENSIVE BREATH; as a gargle in THROAT AFFECTIONS, SCARLATINA, DIPHTHERIA; in fetid discharges from the EAR; OZÆNA, and affections of the ANTRUM; as an application in PARASITIC AFFECTIONS and ERUPTIVE DISEASES; as an injection for the expulsion of ASCARIDES, for LEUCORRHEA, and other abnormal discharges from the UTERUS and VAGINA; as a disinfectant, in HOSPITAL DRESSINGS, for SICK-ROOMS, and all IMPURE and UNHEALTHY LOCALITIES; to prevent the spread of CONTAGION, in EPIDEMICS, YELLOW, TYPHOID, and SCARLET FEVERS, CHOLERA, etc.; and is indicated as a remedy in CONTAGIOUS and INFECTIOUS FEVERS and other diseases.

Used to meet varying indications, in its full strength, or diluted with from one to twelve times its bulk of water, or even more, say a teaspoonful to a tumblerful of water.

8 Ounce Bottles. Price 50 Cents.

SAMUEL S. WHITE.

SOLUBLE TOOTH POWDER.

The attention of the Profession is invited to this new Powder as worthy of special consideration. In all the Powders hitherto offered, the aim has been to furnish agents adapted not only to the cleansing of the teeth by their mechanical action, but also to combine with them others possessing remedial qualities, in view of their adaptation to diseased conditions of the gums or mucous membranes.

It is, however, unquestionable that very many persons do not need in a dentifrice any other than a mechanical agent which shall be pleasant to the taste and agreeable in odor, by the habitual use of which the teeth may be kept clean, and as a consequence the gums healthy. Moreover, when not indicated on account of their astringent or tonic properties, such ingredients are objectionable, because of their insolubility, and the liability on this account to become a source of irritation to the gums by lodgment between them and the teeth. Another objection, which applies more or less to such dentifrices, is the persistent, astringent or bitter, and sometimes acrid, taste which they leave in the mouth. This is strongly objected to by many, especially by children. With these facts in mind, it has been deemed desirable to add another to the various preparations hitherto offered, designed to meet the requirements of cleanliness and taste alone, without other medical property than that included in its antacid quality. It is believed to possess the hardness necessary for the removal of slight accumulations of tartar, without any liability to injure the enamel, and, being soluble in the fluids of the mouth, is not open to the objections above enumerated, while it is grateful to the taste, and leaves no unpleasant after-impression of bitterness or astringency.

Price, in 1 lb. tin cans..... \$1.50
 " 4 " " 5.00

SAMUEL S. WHITE.







